

# AVIATION WEEK

A MCGRAW-HILL PUBLICATION

AUGUST 1, 1955

50 CENTS



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PUBLISHED FOR BETTER UNDERSTANDING OF THE MISSION OF THE U.S. A.F. AIR DEFENSE COMMAND

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# FACTS

about

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The diagram shows in section the New Departure Senti-Seal. Its conforming surfaces are free ground simultaneously with the ball race, giving an extremely high degree of concentricity between sealing surfaces and the raceway. Senti-Seal is available for a range of sizes in single-row, standard-width bearings and also in two types of New Departure angular bearings. Sizes, dimensions and capacities are listed in the latest New Departure catalog.

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## NEWS DIGEST

### Domestic

USAF flight test crew from Edwards AFB last week took over Phase 2 testing of Lockheed Aircraft Corp's first prototype YC-119 Hercules. Tests will be flown from Palmdale by Edwards ground and air crews. Production Allison T56 turboprops, meanwhile, were being installed on the second prototype, replacing experimental Y2R engines that have powered the two test market cargo planes until now.

Convair-San Diego awarded a \$8.5-million Air Force contract for 10 cargo personnel versions of the Model 440 transport. Aircraft are for Strategic Air Command and Military Air Transport Service. Delivery is to begin July 1956.

Largest subcontract at McDonnell Aircraft Corp's factory, now totaling \$57,375,000 for F-101 Voodoo aircraft, was placed with General Electric. Martin Aircraft is building wings for the USAF jet fighter under a small production contract.

Rear Adm. Apollo Sasaki, 53, retired chief of Navy's Bureau of Aeronautics and holder of early altitude records for powered aircraft, died July 27 in Washington, D. C. Sasaki was graduated from the U. S. Naval Academy in 1921 and qualified as an aviator three years later. In 1929, he set altitude records of 39,340 ft. for land-based aircraft and 35,500 ft. for sea planes. In 1939, he reached 43,166 ft. in a flight that drew criticism for the first time to temperature and wind problems at high altitudes.

Carlin-Wright Corp. received new USAF contracts totaling \$40,901,985 for production of J63 turbojet engines.

Fairchild Engine & Airplane Corp. purchased the assets of Rhodes-Lewis Co., subsidiary of McClellan-Kirk Co. The Los Angeles firm's line of high-pressure compressors, valves, jets, and related items will be integrated with the parent's aircraft accessories produced by Fairchild's Static Division.

Conquest Aircraft Corp. will begin construction the month of a new avionics research and laboratory building at Edinburg Park, Ariz. The unit will conduct R&D of the aerodynamics and electronic development departments at Conquest's Arizona plant.



### Pilot Skill Saves Prototype Gnat

New Zealand's first light aircraft was used by a skilled test pilot after its engine blew out and struck him on the face and shoulder while the plane was doing 600 mph. The blow ripped off pilot E. A. Tinsley's helmet, leaving him without oxygen or vision at 30,000 ft. While looking for his lower field, the fuel supply ran out. Then, while on final approach, his landing was helped by another aircraft's wing. Tinsley pulled up the Gnat's wheel and made a safe belly landing with only superficial fuselage damage. The airplane is scheduled to receive its flight test this month. Plans show the new Gnat put prior to its first flight (AVF July 25, p. 7). Changes over its prototype, the Midgy, larger interior for new and more powerful 1325-hp engine, and larger horizontal stabilizer. Midgy had 1,040-hp thrust Armstrong Siddeley Viper jet.

New \$5.2-million air transport at Milwaukee's General Mitchell Field opened July 22.

### Financial

Republic Aviation Corp.'s consolidated net income for the first half of 1955 totaled \$3,812,390, more than double the \$4,997,818 for the same period last year. Sales amounted to \$39,594,755, compared with \$16,694,949. Percent backlog of backlog orders 5700 million, declining from 5900 million a year ago.

Glen L. Martin Co. reported a net profit of \$5,127,370 for the first six months of the year, dropping from \$6,542,602 for the first half of 1954 when no federal taxes were reported because of losses carried forward from earlier years. Sales totaled \$18,999,091, increasing 10.6% over the same period last year.

### International

Sir Arnold Hall, one of Britain's leading aircraft and guided missile experts who heads the Royal Aircraft Establishment's Comet investigation, will join the Hawker Siddeley group.

as technical director and chief of the group's design council in November. Appointment is intended to increase guided missile and aerospace aircraft projects at Hawker Siddeley.

British European Airways suspended London's first scheduled helicopter shuttle service July 25. The airline will operate Westland S 55s on night routes to a day between Walsby Air Terminal and London Airport.

Belgium and West Germany signed a bilateral air agreement that gave Luxembourg landing rights in London, Manchester, Glasgow and Edinburgh in return. British European Airways will be able to land at Harrogate, Manchester, Doncaster, Cologne, Frankfurt, Stuttgart and Nuremberg. The German airline also obtained rights at Bremen on route to Munich, Vienna and Rome.

Turkmenistan's Belmoravia completed the first phase of water tank tests by the Belmoravia Belmoravia test at Fushanbo, making 5,000 simulated flights in full penetration and maintenance. Tank tests will continue in the near future also as a test for reduction and other research.

[illegible]

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## WHO'S WHERE

### In the Front Office

**Gene Hanks**, president of Life Control Systems and a member of board of directors, **De R. & C. Inc.**, a Los Angeles, CA, provider of services to the FAA, is also a member of board, and **Joseph J. O'Connell**, chief officer.

**Harry E. Riddle**, executive vice president of Bellini Aircraft Corp., Riddle formerly was general manager of Goodhue Aircraft Corp. and vice president of IngleWaters Corp.

**John J. Curren**, vice president/treasurer of Riddle Aircraft, Office now offices **Jose E. Ramirez**, secretary, **J. W. Levenshade**, assistant secretary.

**Tom Hadden**, assistant vice president operations and facilities, **America's Aircraft**.

### Honors and Elections

Walter Lee Farnon, board chairman of Trans World Airports, elected president at the International Chamber of Commerce.

Henry Blackstone, president of Service Corporation of America, started vice president at the Institute of Navigation.

Russell C. Galloway, director of business operations for Lockheed Aircraft Corp., George Brown and John E. Wiley, Jr., plane manufacturer at Douglas Aircraft Co., Long Beach, Division, elected members of the Controllers Institute of America.

## Changes

W. H. Hakes, general manager of North American branch of Avco, Civil & Military Aircraft Greater; also president of G. W. Hakes, Inc., distributor of aircraft maintenance at the company's Columbus, Ohio, Division.

Dr. Clement J. Harmon, director of International Health Services, Public Health Company, Jacksonville, N. Y.

Dr. Gerhard J. Hennig, staff member of the Advanced Research Division of Illinois Helicopters, Falls Chu, Calif.

Dr. H. L. Gamm, controller of Ford Aircraft Division, Chicago.

Walter S. Powell, manager of the Maintenance Division of Vyn Diesel Aircraft Supplies, Chicago.

Fred G. Brown, compiler for Avco Division of VCF Information, Inc., Phoenix, N. I.

**Dr. Warren C. Stokes**, director of the new Research Polymer Institute, Hartford Graduate Center, set up under the joint sponsorship of United Aircraft Corp. and R.T. French, members for several years of the R. Gordon Casswell advisory committee.

**C. Bruce Smith**, advisory associate professor.

**Dr. Michael J. De Vore**, chief electrical engineer, Polymer Research & Development Co., Brooklyn, N.Y.

**Jack A. Smith**, manager of research of membrane, Northing Aircraft, Inc., Hawthorne, Calif.

**George H. Gassner**, director of manufacturing of the New York Air Service Co., New York City.

## INDUSTRY OBSERVER

► North American F-40D is scheduled to make its first flight in October. The Dog model of the Super Sabre series will feature boundary layer control without engine compressor air bleed boxes over the wings for better landing characteristics and will be equipped with auto-pilot, intercept radar and probe and drogue refueling devices. A substantial portion of the current F400C order has been shifted to the Dog model for fighter bomber and low, near coast strike duties.

► Total of 13 Northrop SM-62 Streak missiles have dropped into the Atlantic ocean prematurely during flight testing at the USAF Long Range Missile Test Center, Patrick AFB, Fla. These objective antennas were caused by guidance malfunctions. USAF says it is now releasing to the waters off Cape Canaveral an "Streak-related mystery."

► Douglas Aircraft Co. is considering Los Angeles International Airport as a possible location for its DC-8 final assembly plant. The company already owns 40 acres there. Other sites mentioned have been the Douglas Long Beach and Tucson facilities. Long Beach runways at present are not even long enough for final tests on the B-66 jet bomber. The B-66 now must taxi off from Long Beach short of much equipment, with final work done at Tucson. Company is asking Long Beach City Council to provide funds for runway extension.

► North American Aviation's efforts to break into the executive transport market with a 300 mph twin engined aircraft for the Navy are getting stiff competition from a transport version of the Douglas A1D Skyraider. Navy is extremely interested in the transport version of the A1D as a high speed attack aircraft as well. Navy has on these reasons:

•USAF has accepted the first production version of the Convair F-102A. The production version has a different paint job than earlier F-102A models featuring a gray fuselage, black-painted rubber nose and dual green patches on the top of the nose ahead of the cockpit and on the top of both engine air intakes. Officially released dimensions on production F-102A are length 66 ft., wingspan 38 ft. and height 18 ft. F-102A has been flown to an altitude of over 55,000 ft., during public tests at Edwards AFB.

►North American's modified F-100 manuevering down to correct high roll-rate control problems (A/W Feb. 28, p. 16) still has stability problems just below Mach 1 but settles down after passing the speed of sound. F-100 still has trouble getting much higher than 51,000 ft.

\*General Electric engineers say that the J73 turbojet will be the last of their line to use titanium extensively. They will avoid use of much titanium in future designs as a result of their experience with the metal on the J73.

► National Advisory Committee for Aeronautics will build a hollowed top wing this fall to handle speeds up to Mach 18. The wing will use metal spars from a family of non-combustible alloys. Cost will be \$45.6M.

\*Canada will contribute about \$321 million to the cost of building the North American radio warning network. The Mid-Canada atmospheric early warning chain will cost about \$170 million and be paid for completely by Canada. The Pinetree network named jointly by the U.S. and Canada will cost about \$454 million. Canada will pay one third, \$151.3 million.

► Second English Electric P.1 supersonic fighter made its first flight just about a year after the original prototype flew. English Electric chief test pilot R. P. Beasant flew both models of the P.1 powered by a pair of Siddeley turbojets.

► De Havilland Gyron, a turbojet designed to power supersonic fighters, has made its first test flight in a Short SA-4 Sparrow bomber rigged as a flying test bed. The Gyron is now flying as the lower engine in one of the post-twin-engine Short nacelles. Later another Gyron will replace one of the standard Avon in the lower position of the starboard nacelle.



## TITANIUM helps lift the C-130 higher and faster... with heavier payloads

Titanium is an essential material for high-performance aircraft. On the new Lockheed designed Air Force C-130 turbo-prop medium combat transport, titanium's high strength-weight ratio... exceptional resistance to corrosion... and freedom from stress corrosion cracking, play a vital role.

Lockheed uses REM-CRU A-55 and A-70 extensively in the C-130's power plant enclosures—fire walls, stator, ribs, longerons, and

skins—where outstanding properties are needed at elevated temperatures.

REM-CRU, processed in titanium alloys for advanced aircraft applications, has substantially expanded its facilities. Now you can be sure of the availability of the REM-CRU titanium grades, sizes and shapes to meet your needs. And for help with application or fabrication problems, REM-CRU's engineering staff is always at your service.

*To keep abreast of the latest developments in this vital metal, write to Dept. 44 for the Rem-Cru Review—a free periodical providing the latest technical data on titanium alloys.*

# REM-CRU TITANIUM

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## Washington Roundup

### Engineer Shortage

Acute shortages of research and development personnel were reported by the majority of aircraft manufacturers surveyed by the Bureau of Labor Statistics for the National Science Foundation. Situation described by practically all of the nine aerospace manufacturers surveyed by the BLS survey of 280 industrial firms is covered by the constant of new engineering unemployment.

"Our organization has been literally flooded in its development work by the availability of qualified personnel." Shortages of electrical engineers, physicists, metallurgists and qualified supervisory personnel for research and development projects were also reported by several companies surveyed.

### British Security Relaxes

Britain's military security system has been relaxed to permit more information to be available when a new aircraft or equipment comes off the secret but not initial publication. Unofficial pictures and data derivable from these pictures are now permitted on initial publication by British magazines and newspapers. The new regulations will be reviewed again within a year to determine if further relaxation is necessary. British officials voiced the hope that others will check with these regulations if they think they are getting into a competitive area.

### Atomic Plane Progress

Rep. James Patterson, a member of the Joint Congressional Committee on Atomic Energy, reports that atomic aircraft are on the verge of a major breakthrough in development of an atomic aircraft. The progress cited by Patterson is believed to concern some lightweight aircraft of design, although it is no secret that major progress is also being made in developing a practical atomic aircraft. Patterson represents Connecticut, site of the new Pratt & Whitney atomic engine research facility.

### Propriety Regulation

Really has a new Air Force regulation appeared with some technical flaws. AFM 90-168, dated Feb. 14, is a "general standard of conduct relating to conflict between private interests and official duties." Published as the one of congressional probing into reports that Air Secretary Harold E. Talbot used his USAF benefits and powers to promote business for Lockheed & Co. (see page 110 the regulation makes it clear that all personnel are "prohibited from using their military titles in connection with any commercial enterprise." Regulation is signed by Gen. Nathan F. Twining, Chief of Staff, "By order of the Secretary of the Air Force."

### Moral Bargain Rate

More transportation bargains given by U. S. Air Force to 280 troop members of the Moral Re-Armament movement was not sold through regular channels. The combination of Congressmen, Defense Secretary Wilson and Air Secretary Talbot got three C-119 transports allocated to the job of taking the group from Manila to Geneva at the special government rate of \$15 a hour

per airplane, as opposed to the normal civilian rate of \$775. In honor USAF's Commissioner, Ralston Dimes, in the Office of Information Services, which ordinarily handles such requests, gets distance of them in the course of a year and in respect to explaining why USAF does not sell transport to civilians with an national defense mission. The office never heard of the MRA deal until the story broke in the press.

### Bilateral Pressure

Senate Intelligence Committee Subcommittee hearings on bilateral air agreements have gone apocalyptically in the latest case of congressional war-the German bilateral. Sen. George A. Sullivan (D-Ia.) got Civil Aeronautics Board Chairman Ross Bailey to admit that the Board decided to be more liberal with the Germans after State Department urged a more aggressive line. Bailey also said the CAB still thinks U. S. carriers aren't hurt as much as they think they are.

The hearings established that pressure responsibility for determining what routes should be traded in bilateral negotiations lies with the CAB, and the State Department must not and that State supports CAB findings. Both federal agencies pointed out that they share an interest in their "host" the airlines. The airlines are hoping that some delicate formula for closer consultation between the industry and government in bilateral negotiations will come out of the hearings.

### Lucas Dropped

Wynette H. Lucas has been dropped by the White House as a replacement for Civil Aeronautics Board Member Jack Lee. Lucas was all set until publication of his choice (AW July 15, p. 11) brought him pressure from Dallas against the former Texas congressman, who is from Fort Worth and led the successful congressional battle for funds for Ames Center Airport.

### Airlines Shop for Jets

Major airlines were reported near a definite last week on purchase of jet transport aircraft. Boeing Airplane Co. and Douglas Aircraft Co. rock hoped to announce the first U. S. commercial jet transport sale within a very short time.

Airline executives, such as Jack Tarpey of Pan American World Airways, were described as "contending" between Boeing and Douglas. Boeing is looking for the Boeing 737 jet prototype and the Douglas DC-8 drawing board design.

A report that the first major sale has been made by Boeing was denied by the Seattle firm.

One manufacturer's spokesman to look over the Boeing 737 jet prototype and the Douglas DC-8 drawing board design.

With Boeing and Douglas seriously working overtime on a jet transport pitch, Lockheed Aircraft Corp. was considered a strong sales campaign for its turbo-prop Electra. Lockheed last week was looking for efforts of Western Air Lines to mount an Electra design.

Said W.A.L. President Terry Dinkens: "We might be interested in turboprops."

—Washington staff

## Red Far East Air Buildup Continues

**ROK air force chief worried with only two wings of F-51s and F-86s facing 300 MIG-15s and 100 B-28s.**

By Claude Witter

Seoul, Korea—Between 7,000 and 8,000 Communist planes, nearly a third of all Red combat air power—is concentrated today in the Far East and the western part in the West's line of defense is at its vulnerable capital only a few miles from the pigsty frontier.

In an interview with *Air Force* magazine, Lt. Gen. Kim Chong Yul, chief of staff of the air force of the Republic of Korea, expressed serious concerns over the fact that his air force will be standing alone in the race the U. S. Air Force is scheduled to withdraw in each 1957.

Facing a change in the political situation, Gen. Kim then will face the Communist threat with that fleet of:

- One wing of F-84 Mustang piston powered fighters.
- One wing of F-46 Sabre jet fighters. Only five of these planes are on hand. The rest will be delivered in late 1955.
- One squadron of C-46 transports. Six have been delivered.
- An Air Force of 36,500 men.

According to Gen. Kim and sources at the Far East Air Force Headquarters in Tokyo, the Red buildup in the Far East has been marked by a gradual shift of its power from Manchuria and North Korea to the area around Formosa.

The total of more than 7,000 Red combat planes includes about three thousand Red China, North Korea and Russia itself. In the case of North Korea, Gen. Kim said, the buildup of planes and of skills to support them is a "very serious" situation from which could be both sides from hostilities engaged in the Korean war.

Here are his estimates of Communist air strength faced by ROKAF in the other side of the 38th Parallel:

- Total of 300 jet fighters of the MIG-15 type (105 of the 1st Communist 1,000 plane MIG-15 force) are in North Korea. Several hundred others are with in striking distance of the ROK capital.
- About 100 B-28 twin jet bombers of a total force of 700 planes have been moved from Manchuria into North Korea. According to RFAF, this moved is a major threat because it has the ability to drop atomic bombs to meet the crisis in the Far East.

• A composite squadron of piston-engine bombers in North Korea. Gen. Kim was not specific about the type, but RFAF says total Communist power in the theater includes 200 medium piston-engine bombers of the B-25 type and 230 TU-4 bombers copies of the American B-29.

- A strong force in Manchuria that freely flies to the North Korean forces.
- Thirty-five North Korean air fields, 15 of them equipped to handle jets.
- A long-range chain of underground tunnels to permit Red aircraft in North Korea.

Gen. Kim's air force of 16,500 men to him is more than inadequate.

"Our forces," he told *Air Force* magazine, "are not properly balanced. The Republic army is the best equipped in the world, 650,000 men. Out of 16,500 in our air force we now have only 50 jet pilots and seven bases. The ROKAF needs more trained men and more aircraft."

Gen. Kim said he has another 250 pilots ready to be checked out in jets but the lack of instructors—there are only five ROK jet pilots with this rating—will impede the progress.

### USAF to Encourage

Backslapping Gen. Kim's view today, USAF has the strategic defense of the area in its present condition but it is no secret that USAF plans to evacuate most Japanese bases at least in 1960. Most of these are used by Lt. Gen. Roger Ramage's 4th AF with headquarters at Nagoya.

To meet the South Korean defense needs, once USAF moves out, Gen. Kim may be needs at least five jet fighter wings. He will have half the strength of his air force to replace his F-51 fighters with jets.

Gen. Kim, 59 years old and a graduate of the Japanese Military Academy, does not rest his arms because the Panama zone today is tending to become the link of Red air power in the Far East. It has been reported out that at least of six, USAF bases in the zone, Okinawa and in the Philippines could be immobilized by atomic attack.

In the two, bases in Japan and South Korea would give the American planes their only possible base within striking distance of the Chinese mainland.

Gen. Kim just explains not only on his need for combat aircraft but also on the related fields:

- Since his air force of 16 ROK aircraft has been limited at its maximum by USAF. To keep up their skills and the tone when ROKAF has a solution but none of its own jets, they are working with USAF crews on F-101 planes.
- Major Japanese aircraft in USAF air bases are pulled out of Korea will be construction of a new training program to train South Koreans on the maintenance and operation of modern communications equipment, including a radio warning network.

### Strategic Basis

USAF's 614th Advisory Group, headed by Col. Van H. Sabin, serves as liaison between USAF and ROKAF. Currently, most of its work is concerned with the supply of fuel, which was essential to Gen. Kim's operations. Fuel advisors, work is concerned in monitoring the latest work and technical training, material problems and the budget.

By 1957, the work will change. When USAF leaves South Korea, its main job will be to train, along with a teaching staff to build up the communications program.

In its strategic air power in command, Gen. Kim stands today as the only potential force in the Far East. He is a graduate of the Japanese Military Academy. In several thousand miles of his own Japan, this reports has been enough USAF has, consequently, refers to recognize that SAC, Japan and the other side, are more likely to run Far East Japan.

A Japanese spokesman, whose statement has not been confirmed by RFAF, has announced that USAF will give up 20 of its 40 bases in Japan. At least 16 of the rest, he said, will be moved to accommodate long range bombers.

This announcement would appear to have resulted from growing Japanese pressure over USAF base expansion that would require relocation of nuclear forces from a base that has been worked for generations by the same families. USAF has recognized this problem and sought the government's aid in solving it.



## Talbot Quits Mulligan, Clings to USAF

By Katherine Johnson

Washington, D. C.—Patrick J. Hanley Jr., Talbot as Secretary of the Air Force, ended last week the decision of President Eisenhower after the President completed a consultation of the cabinet in which Talbot's proposal in the New York management firm of Paul H. Mulligan & Co.

President Eisenhower's decision is reported to be an attempt to give Talbot a position in the Air Force. The President made it clear in his weekly press conference that although he felt no loss had been suffered by Talbot's resignation, he felt that Talbot's resignation was not equally important in qualifying a man for public office.

As the climax of the Senate Government Operations Subcommittee's criticism of the Talbot-Mulligan relation ship with defense contractors Talbot revealed he had resigned his position in the New York firm and was "manifest" as being USAF attorney, planes and officers in connection with Mulligan business, Talbot said he would not resign his USAF job and appeared to be hopeful that he could retain it by dividing himself of the Mulligan partnership.

At a final meeting, Talbot read the subcommittee a letter he had written to his partner, Paul H. Mulligan, the following day after his appointment. "You know," Talbot said in his letter, "I am leaving, I am leaving before the Senate Permanent Subcommittee on Investigations on July 21 last. I informed the subcommittee that I would resign all my connections with Mulligan and Co. if in the opinion of the subcommittee such action would be desirable."

"I have now decided that regardless of what the subcommittee's action may be on this proposal, I will dissolve our partnership, and this letter is to inform you as of today's date that I am taking the proper legal steps to do

this. I am sure that our partnership agreement contains a provision regarding a month-day notice of withdrawal to dissolve the partnership. But I am aware that you have such notice in order that dissolution may take place at the earliest practicable date, which I suggest be at the close of business on July 21, next."

"In view of the fact that the subcommittee will have no matter under consideration, I do not wish to take any public action that might be thought designed to cut short this investigation. Will you therefore not give any publicity to this letter, however, I want you to know that no damage is made."

Talbot's expected to get a clean bill of health in the "legislative" of his attempt on behalf of the Mulligan firm—both from President Eisenhower and the Senate subcommittee. But the propriety of his return is likely to be held off during the presidential campaign of next year.

In a subcommittee report, as in individual opinions, members of the Senate subcommittee are expected to criticize Talbot's:

- Participation in procurement of a

contract with Radio Corp. of America by the Mulligan firm.

• Activities in soliciting business for the Mulligan firm.

• Possible loss Aviation Corp. business with the Mulligan firm.

On the formation of one contract with RCA in the fall of last year, Mulligan made efforts to obtain a second contract. Each in the negotiations, Talbot displayed David Sarnoff, chairman of the board of RCA and an old acquaintance to put that way by Mulligan. Talbot insisted, but he understood was that the contract was to be with a "second" division of RCA. Other sources, including Sarnoff and Sarnoff, revealed that RCA, and John Johnson, General Counsel of the Air Force, notified to their close understanding that the contract was to be with purchasing divisions of RCA doing substantial electronic business for the Air Force.

In January, Mulligan reported to Talbot that RCA attorneys questioned the effects of a contract with a firm in which the Secretary of the Air Force was a partner and had requested a ruling by Attorney General Herbert Brownell.

### Talbot's Income From Firm

Below is the gross annual income of the Paul H. Mulligan & Co. since it was established, showing the difference between the two parties—Talbot of the Air Force Harold Talbot and Paul Mulligan—presented to the Senate Permanent Government Operations Subcommittee by Mulligan.

Year Ended	Gross Income	Mulligan	Talbot
Jan. 31, 1948	\$7,680	\$23,775	\$1,417
Jan. 31, 1949	91,525	256,317	4,837
Jan. 31, 1950	369,180	90,718	27,764
Jan. 31, 1951	269,000	67,802	42,802
Jan. 31, 1952	328,940	75,264	80,804
Jan. 31, 1953	275,880	42,369	42,369
Jan. 31, 1954	405,840	90,718	62,939
Jan. 31, 1955	410,900	91,612	46,681
Total	\$2,615,275	\$497,796	\$250,476

## Talbot Reaction

Secretary of the Air Force Harold Talbot's activities to promote the business of Paul H. Malligan and Co. have become a major political issue.

Three leading newspapers denounced Talbot's resignation: the New York Times, the Washington Post and Times Herald, and the Los Angeles Times.

Sgt. Wayne Moore (D-09) is a speech on the Senate floor plying his "merchandise" to Talbot's declared "Government will not be clean until we can clean out of it men who have no private appearance of their ethical obligations to respect to confidential informants, thus men such as Mr. Talbot."

Paul Butler, chairman of the Democratic National Committee, stated: "How can there be any doubt as to the size of his (Talbot's) office for personal profit . . . if anything is going to be done to reform Republican practices to maintain morality in government, it is up to the President to act promptly in the public interest."

re'll before proceeding. Talbot was named USAF Counsel Johnson to his office and a cill was placed to RCA Counsel Irving. At this point the testimony differs.

In his first subsequent appearance Talbot did not recall the episode.

Under close questioning, Irving stated by his testimony that Talbot had told him that RCA should "get out of its high home" and "stop being so high and mighty" and pointed out that "12 or 15" other firms with defense contracts had Malligan contracts. The firm based AVCO, General Aviation, and several others, Irving said.

Johnson testified that the telephone conversation did take place and that Talbot replied it after he (Johnson) had released his memory—a fact later confirmed by Talbot. Neither Talbot nor Johnson remembered Talbot's mentioning firms with defense or Air Force business having Malligan contracts. Talbot gave as the reason for the call to Irving his concern at having his religiosity challenged.

Johnson subsequently drafted an opinion upholding the legality of an RCA contract with Malligan, in view of Talbot's connection with the firm and involvement at it (Brown).

Several days later he told Talbot that "it would be against our policy to give any opinion to any outside private concerns like RCA."

Memoranda and letters from the file of the Malligan firm made clear that Irving became Secretary of the Air Force Talbot's continued action on the role from continued in the con-



**YAKLEV** captain colonel Hov, a world's largest service-type company in bulk to Pacific H-14 series. Two corresponding figures show this sample design.



**BADGER** embodying an aircraft pilot and pilot source shows cargo capacity of engine. Cargo compartment is fabric-covered, nose and tail sections are metal-clad.



**LIFEBOW** Two Hovs have at Talbot. Social sources indicate at least 40 in view.

respondence included Aero Corp., Electric Autolite Co., Bellman-Lane, Hamilton Co. Ohio Industries, Sports Corp., Calumet Airlines, Ohio Northern Chemical Co., and numerous others.

In discharging his secretary from the Malligan firm, Talbot said he doubted if he has devoted "two and a half days out of an two and a half hours to Secretary" to Malligan business.

Talbot said "I have not done anything that could be continued as a lawyer or (legal). I have never used my position as Secretary to promote any and to put Malligan business."

Under questioning, Talbot said that he has never deviated the purchase of assets contrary to the recommendations of the air staff.

When Talbot's resignation to be

## Which Pentagon Conceals



**BADGER** this man over Talbot, showing off lines of Soviet's newest medium bomber line and performance compare with Boeing B-47, Soviet Badgers have been built.



**BADGER** features revealed wing design, two large turbojets mounted at leading edges.

Secretary was up for Senate confirmation early in 1953, he testified that a formal agreement had been made "in such way as to deny the fact that Malligan personally while I am in Washington that had to do with defense work essentially."

It was developed at the Senate hearings that 80% of the business of one Malligan client—Aero Corp.—is con-

nected with the Defense Department.

A letter from Malligan to Talbot dated May 12, 1953 and

"You will be pleased to learn that Aero Manufacturing Company, general aviation division for us to undertake work for them on July 1. Mr. (Victor) Emanuel originally wanted to handle it on a basis of a separate contract for each of his divisions. How-

ever, upon reviewing his organization, it was found that many of them were too small to be dealt with in this manner. Consequently, we are writing a similar 12 month contract to cover all of Aero."

In view of Aero's substantial amount of defense work, Senators' approach raised the question as to whether it should not have been considered as being "essentially" a defense contract. Aero was reportedly awarded a role in the USAF Atlas missile program.

Two aircraft firms figured in the Senate hearings.

- Douglas Aircraft Co.
- Convair Division of General Dynamics Corp.

Talbot confirmed a report by George C. G. Williams, representative of Douglas, that he had accelerated the work of the Malligan firm and his connection with it at a session with Donald Douglas Jr., president, and Donald Douglas, Jr., vice president, and Gailly last October.

Gailly reported to the subcommittee. After an exchange of greetings.

Mr. Talbot stated a message: "I would like to explain . . . It is difficult for me to say that I have acted on other concerns besides this one, that when we have been in his office and had had great responsibility on his mind as secretary, that he would start in and talk about them to Mr. Douglas, without any relationship whatsoever to the business we were going to discuss . . ."

"He mentioned that he had some relationship as a management engineering concern, and that it was a good business, that it was made some mention of routine work, but he also, in the course of it, mentioned one company that I can remember, Hatfield Oil Company, as being one of the clients of the company."

"Then he looked up all of a sudden while he was engaged in this conversation, and with an unusual coming from Mr. Douglas Sr. or Jr., and he said, 'Why, perhaps I shouldn't mention that in your presence.'"

"When we left the office and had gone out in the hall I made the comment, 'I wonder what in the hell the Secretary thought up that subject for?'

In his testimony, Talbot repeatedly protested that he had never entertained the slightest notion that Douglas should contract with the Malligan firm.

Testimony that he had never approached aircraft companies for business, Malligan reported to the subcommittee that he had met several with "D" Talbot, especially at Convair Malligan and that the reason was not for business purposes and that "I wouldn't emphasize I could do so business (with Convair) it was a get-together meeting."





into the magazine with top speeds ranging from 440 to 550 to Mach 2 (USAF) speed for each aircraft has been emphasized this spring by the rapid technical progress of the Racoon as a concept, which also resulted in accelerated production of the Boeing B-72 long range jet bomber.

It was made clear that decision to emphasize the intercept version of the F-16H will not interfere with plans to award a contract for another long range interceptor. Decision on this competitive bid is expected this summer and recommendations are known to be at the hands of Air Force Secretary Harold E. Talbot, awaiting action.

## Board Fixes 33 Steps For West Coast Line

First order in permanent certification of a local airline has been issued to West Coast Airlines by the Civil Aeronautics Board.

The CAB ruled 23 of West Coast's points for permanent certification and 5 points for temporary certification as-

signed the traffic certificate previously announced by the Board in a minute of permanent (AW June 6, p. 14).

The permanent certification came of two other local service airlines—Trom Aero and Southwest Airlines—are being processed separately because their revised proceedings were nearly complete when the certification legislation was enacted.

### First Step

The West Coast does cover only a few steps in an accelerated certification program outlined by the CAB as first order Congress directed the Federal Aviation Commission to grant permanent operating authority. Objections to the order must be filed within 60 days, and hearings will be held limited to issues raised in any objections filed.

Under the law, the entire decision to be made by the CAB concerns the status of the points scored in the local service airline. The law requires the Board to give permanent status in all terminal points and at least half the intermediate points served by each carrier.

CAB set a permanent certification of four passengers per day (about 500 a month) as a reasonable justification for permanent.

### Taxicab Excluded

Applying this rule, the Board proposed to grant permanent certification for 25 of West Coast's points. A taxicab three year certificate is proposed for eight of West Coast's intermediate points which don't meet the four-day rule.

The order does not include Tacoma, Wash., as the certificate. West Coast's present certificate names Tacoma as a point but the airline has never served it. The CAB concludes that such a point is not eligible for inclusion under the law.

Points served by West Coast under common carriers and other points served by exception are included in the certificate but the Board feels that the law doesn't provide for non-operation of taxes as conditions in the present certificate.

The CAB has emphasized that the question of permanent of temporary certification will have no effect on service in the points in a carrier's certificate. All points will continue to serve the service they presently serve, but those points with temporary status will be subject to review in three years to determine whether they can economically support local service.

## Metal Blades Tested For Two Helicopters

Introduction of all metal rotor blades on the Bell H-13 and Hiller H-23 helicopters is likely in the near future pending the result of tests to reduce manufacturing costs.

USAF's Air Research and Development Command and successful flight and ground tests have been conducted at Wright Air Development Center on two experimental metal blades.

A steel spar blade designed and built by the Parasol Corp., Tuscon City, Michigan. The spar forms the leading edge of the blade in which aluminum skins are fastened to form the air section.

A bonded metal blade produced by the Helicopter Division of Bell Aircraft Corp., Ft. Worth, Texas.

ARDC said the new blades will be stronger, lighter and more precise than wooden blades. Major point in their favor is individual interchangeability, making it possible to replace a single damaged blade without installing a whole new set of balanced blades.

Production and maintenance costs also will be reduced, according to ARDC.



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## Defense Sets Engine Export Rules

U.S. jet engine manufacturers cannot sell their new power units to foreign airlines or license their production to other countries until they are five years old, according to a new Defense Department directive.

Following lag and heated efforts of American engine builders to loosen the security straps that have impeded commercial jet foreign sales, the department has defined a "phased release program" to guide in distributing information "to that degree possible" will be provided.

In the long run, the directive makes clear, the Navy or Air Force will decide whether data can be released. Changes in the international situation may necessitate or extend release of data about a particular engine.

Recognizing industry efforts to bolster commercial and foreign sales, the directive says the program is designed to assist in the planning of commercial sales to nations not U.S. markets abroad.

In the following schedule data marked (A) can be released on completion of the 30-hour preliminary flight testing test. Data marked (B) can be given to commercial prospects when the second tests have appeared the 110-hour endurance qualification test. The numbers are time in years.

	A	B	C	D	E
	Security Classed U.S. Aircraft Manufacturing	Security Classed U.S. Aircraft Manufacturing	U.S. Aircraft For Common Operations	Foreign Aircraft Operations	Foreign Aircraft Operations
1. Preliminary performance & maintenance data	(A)	(B)	(B) plus 1	(B) plus 1	(B) plus 1
2. Complete performance & maintenance data	(A)	(B) plus 1	(B) plus 3	(B) plus 3	(B) plus 3
3. Engine delivery for prototype military operations and maintenance data only	(B)	(B) plus 1	(B) plus 2	(B) plus 3	(B) plus 3
4. Engine delivery for production aircraft & delivery to military	(B) plus 2	(B) plus 2	(B) plus 3	(B) plus 4	(B) plus 4
5. Production and maintenance data & drawings	—	—	—	—	(B) plus 4

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## Senators Are Hurrying Second Airport Plans for Nation's Capitol

SENATE COMMERCE COMMITTEES aimed to get serious on consideration of a second airport for the nation's capital in the heated race before the adjournment of Congress.

In view of the increasing congestion at Washington National Airport, there was general agreement at hearings before Commerce's Aviation Subcommittee on the urgent need for a civil airport facility.

Senators were skeptical of the Air Administration plan, presented by the Air Secretary of Commerce for Transportation, Louis Ruffolo. Under the Ruffolo plan, some consolidation of local government—Maryland, Virginia, District of Columbia, or contractors—would take the initiative in locating an "airfield" after the pattern of the Port of New York Authority to finance 95% of the cost of a second airport by bond issues bearing 3.5% interest. The federal government would make a grant to assist the remaining 5% cost. The authority would purchase Washington National and operate it jointly with the new airport.

### Senators Object

With an economic in one day at Washington National, the "initially in adequate," Ruffolo said the joint operation could be a proving proposition.

He said that the fee houses at Washington National are "unstable regardless of the second airport issue."

The same objection could be stated to the Administration plan is that it would take too long. Before the local governments could agree on a project and state legislatures passed

the necessary implementing legislation, Commerce Committee's chairman, Sen. Warren Magnuson (D-Wash.), estimated that it would be three or four years before construction would get underway. Sen. Frederick Price (R-Me.) agreed.

Magnuson also objected to the payment of 3.5% interest, asking "who should someone sitting out in Seattle make money from a national airport?" He argued that a direct federal appropriation for construction of a second airport would not only make possible quick construction, but would cut out the additional cost for interest. Magnuson revealed that if the Administration would require funds to start a second airport, the Congress would quickly approve them before adjournment.

### New Airport Needed

Civil Aeronautics Board's chairman, Russ Ryles, took no position on the plan presented by Ruffolo. His testimony simply stressed the need for a second airport.

"An earlier traffic at Washington National has already reached the point where a threat to adequacy of service is present. It is merely a matter of time when growth of air transportation service into and out of Washington will be throttled by lack of airport facilities. Friendship Airport can offer a slight aid to the situation, but we do not see how it is the answer. Accordingly, the Board is of the opinion that a second airport for the Washington area will be necessary in the near future if the full advantages of air transportation are to be realized."

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RECOOP TAD, shows Republic RF-84F to fit tightly under C-82's cargo

## USAF Testing Ficon Combat Readiness

Combat readiness of USAF's radical Ficon concept will be tested by its, on ground C-82's prepared on their wings operating with a tactical operational Republic RF-84F reconnaissance fighter.

The tests will mark the first time the new combination has been tested, earlier tests (AW Aug. 11, 1953, p. 17) were made with a J-48-100 and a YF-100.

The new C-82-100 has improved its gear and bomb bay, having been designed to speed the engine launching and retrieving operations.

Tests will include launching and recovering during day and night in all types of weather and at varying altitudes.

In night recovery, the pilots agree by radio on a rendezvous and a set schedule. The fighter pilot then has plane up with the bomber's destination lights. The C-82-100's bomb bay is illuminated and a spotlight projects the corner's map, which is engaged by a retractable hook on the fighter's nose.

The Ficon concept is designed to allow extra long range highspeed aerial reconnaissance and nuclear weapons delivery with maximum safety.

The U. S. Air Force has activated its initial C-82-100 Strategic Reconnaissance Wing, the 99th, at Fairchild AFB, Spokane, Wash. The unit will be trained with Thunderbolts of the 51st Strategic Reconnaissance Squadron, Great Falls AFB, Mont.

Command hopes to get USAF orders to convert other C-82s into the new improved configuration.



1. SLANT CONVOY C-82-100's search carrier stands nose-down on its loading platform to receive Republic RF-84F "phantom." This is first use of a tested RF-84F in Ficon test; previous tests used a prototype Thunderbolt.



2. RF-84F IS HOISTED INTO C-82-100. Thunderbolt has a retractable hook at nose.



3. DROD UNDER C-82-100, RF-84F "phantom" awaits takeoff. Reconnaissance fighter's tail fits into slot in Carrier's bomb bay.



## Air Forces give McDonnell's new debutante a big rush!

### TEMCO HELPS PRODUCE POPULAR F-101 VOODOO

When the F-101 made her first public bow, she was already a much sought after plane. Designed as a long-range fighter, the Voodoo will first be assigned to the Strategic Air Command to escort our jet bombers. But interceptor and tactical air groups also are casting envious looks at this big new jet. Especially the most powerful fighter in the world capable of cruising at well over the speed of sound for hours, she is wanted for defense against bombers and for use as a supersonic fighter-bomber.

To facilitate production of this important plane, TEMCO was called upon to fabricate aft fuselage sections. The award of this contract indicates the thoroughly satisfactory manner in which TEMCO has been handling work on another McDonnell fighter, the F-3H Devco, and further establishes TEMCO's reputation for producing a quality product, on schedule, at the lowest possible cost.

**ENGINEERS:** If you are interested in a position with a growing weapons systems organization, write full particulars to E. J. Horton, Jr., Engineering Personnel, TEMCO Aircraft Corporation, P. O. Box 4191, Dallas 2, Texas.



Final assembly and inspection of aft fuselage section of F-101 prior to delivery to McDonnell.



## AERONAUTICAL ENGINEERING



BY ADJUSTING CONTROLS on side of NASA F-16 cockpit, pilot can simulate flying characteristics of plane still on the drawing board.

### Variable-Stability Planes Preview Future Handling Characteristics

By William J. Goughlin

Midfield Field, Calif.—In one of the nation's most unusual flight test programs, National Advisory Committee for Aeronautics is trying to actual flight the stability and control characteristics of many aircraft not yet out of the drawing board stage.

This is made possible by the use of test aircraft whose natural stability can be varied in flight to simulate lateral and directional characteristics of other aircraft, even those which have not yet flown.

The two test aircraft, General Dynamics F-105 and North American F-100, are equipped with research tools to NACA's effect to probe the successful critical stability and control problems of supersonic flight.

Other work on variable stability aircraft is being done at General Dynamics Laboratories. CAL's current program involves flight tests of a Lockheed F-104 and a Douglas B-57 to develop criteria for handling characteristics of class of aircraft. Later CAL will test these with a General Dynamics F-105.

At the recent Ames Laboratory sym-

posium, NACA scientists looked at stability and control in two of the greatest difficulties standing in the way of successful supersonic flight (AW July 6, p. 12).

Use of the two variable stability aircraft is permitting advanced research in these fields which could not be accomplished in air when war-

mal equipment, NACA scientists looked at stability and control in two of the greatest difficulties standing in the way of successful supersonic flight (AW July 6, p. 12).

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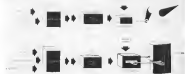
mal equipment, NACA scientists looked at stability and control in two of the greatest difficulties standing in the way of successful supersonic flight (AW July 6, p. 12).



VAMEI on Helicat's right wing provides stability signals to variable-stability system.



HELICAT STABILITY SYSTEM controls both aileron and stabilizer adjustments. Radio remote sidestep input to ailerons, stabilizer, yawing velocity input can be fed into stabilizer.



SIMPLIFIED DIAGRAM shows main elements in variable-stability system/stabilizer system.

roll, or simulates certain dangerous coupling characteristics.

Like an atom of the theory these small airplanes can be used for:

• **Prototype simulation.** The aircraft can be set up to match the predicted behavior of a prototype. This has been done in the case of the B-55, for example. While the P-52 and the F-56 can not capture all the characteristics of a full-scale aircraft, they can simulate certain adverse and important characteristics.

• **Design studies.** The probable dynamic behavior for a large class of future aircraft can be explored without building any of the aircraft. "It will give the designer a little feel for what he will have to watch out for," says flight research engineer Wilbur Kaufman. Advantage over computers here is in actual flight testing.

• **Test and development of stability augmentation.** Since the research use of the variable-stability aircraft is similar to the technique used in flying a non-replicable aircraft with stability augmentation and yaw dampers, much of the program is applicable to the design of those items. The variable-stability component used on the test aircraft is in effect a powerful and versatile stability augmentation. Actual pilots, in fact, often use the equipment in flight to experience the inherent characteristics of the P-52 itself.

Use of the aircraft is not limited to NACA pilots. More than 40 NACA, military and military pilots have logged more than 400 hr in the variable-stability aircraft.

#### Typical Program

This is how these planes are used in a program of prototyping simulation for a customer:

The airborne designer describes the new all his design, such as lateral stability—which he believes can give trouble.

The contractor's test pilot and instrumentation staff agree to take part in the research program. The variable-stability aircraft is set up to match the predicted unusual behavior. In doing this the Ames researchers draw on their extensive background of actual flight observations experienced together with the designer's own computations.

The aircraft then is "tuned on" in flight to match even more closely. At times, results of the flight test program have matched exactly analog computer predictions.

During a three- to five-day program, the contractor's own test pilot flies the variable-stability aircraft and reports back to the company on the flight. This has the added advantage of enabling a test pilot to become acquainted with the perhaps unusual handling qualities of the prototype which he later

## A new kind of airplane makes the news



DAILY NEWS  
WHY DID HELICOPTER-TO-AIRPLANE  
DIVISION MAKE IT? McDONNELL XV-1 CONVERTIPLANE  
MAY 1, 1959

### ... with a new kind of power transmission designed and built by FOOTE BROS.

A revolutionary aircraft, McDonnell's XV-1 Convertiplane, recently made news by completing the first successful conversion from vertical to horizontal flight... a totally new concept of flight which combines the vertical flight characteristics of a helicopter with the speed and range of a conventional fixed wing aircraft.

To help put this remarkable aircraft in the air required a completely new kind of power transmission for the pusher propeller and the rotor which is driven by pressure jets located at the tip of each of the three blades. McDonnell relied on Foote Bros to design and build this highly intricate transmission. The successful flight of the XV-1 is ample testimony to the skill and capacity of Foote Bros to meet the exacting needs of America's great aircraft manufacturers. It will pay you to see Foote Bros from the right place to bring your power transmission and mechanical actuator problems.

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PART OF Y-5B DRIVE MECHANISM is housed in hump at base of F-584's fin. The cone which generates sidestick signals in the system is perforated beneath the engine's inlet lip.

will take up on its first flight.

At least one company pilot reported back to Ames researchers that on the initial flight of a new aerospace aircraft he recognized handling characteristics already experienced on the Ames variable-stability aircraft.

This fits the value of training the pilot in handling the prototype before it flies, "as Korfman says. "That is, within the limits of the characteristics which are being studied. It gives the pilot a familiarity with aspects of unfamiliar behavior."

In some cases, there may be no attempt to match the exact aircraft response. In one specific instance, a company wished to know the effect of sidestick on the pilot in a new design with the cockpit handle for forward tilt. It is impossible to match both sidestick and side accelerations in the variable-stability aircraft that the Ames research on tilt and the company agree that it was the effect of the response that was

of interest here rather than the response itself.

Therefore, the controls were set to provide similar side accelerations on the pilot without regard to the amount of sidestick, since it is this and effect which is of most concern to a pilot.

At the conclusion of such flight test programs, NACA makes such informal recommendations to the various users. It is up to the contractor to sort out the necessary design consequences.

Refined in the prototype-simulation work at Ames are the air program's subsequent missions on new aircraft. When stability and control problems developed at the North American F-100, for example, the variable-stability aircraft were used in various out-of-the-box tests.

In the case of high-speed aerospace aircraft, behavior can be simulated in the F-5 and F-56 which in the actual aircraft might well destroy the vehicle.



HELICOPTER CONTROLS: Radio adjust rolling input velocity in the sidestick and yokes.

During contractor programs, NACA provides ground radio contact and those aircraft when necessary.

#### Test Equipment

Although the strange assortment of plumbing and control leads in the F-56 cockpit has been described as a "joke situation," the contractor test pilot can be checked out on the variable-stability aircraft in half a day.

The F-56, second aircraft put into use in the research effort, is more easily laid out. It is, however, connected with the variable-stability system for only the sidestick.

The type of equipment used to vary the stability of the Ames aircraft is similar for both lateral and directional changes.

In the case of the rudder control system, the pilot's system is conventional with the exception of a differential linkage in the connection between the control pedals and the rudder itself. This permits the pilot to separate the rudder at the same time that the ailerons in the system move. The total rudder motion then is the sum of the pilot-applied and servo-applied motions. While the pilot retains control of the rudder, the directional stability is altered by the servo motions.

A sidestick race feeds signals electrically to the servo-mechanism which moves the rudder to produce the effects desired.

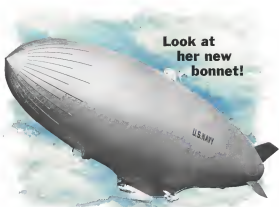
The pilot controls the servo system by means of levers in the cockpit which can be adjusted in flight.

Changes in apparent wing-damping are produced in much the same way by means of a rate gyro which senses the rolling or yawing velocity. A similar system does velocity in the yaw for directional changes in rolling moment.

Power damping has been of particular research interest because of the trend in that direction associated with modern aircraft configurations and increased flight speeds and altitudes," says flight researcher Korfman. On the other hand, the high-damping region is also of interest in connection with related applications of powerful wing damping.

Studies of such factors as roll-to-yaw coupling also are of great importance at a time when difficulties in this region are plaguing high-speed aerospace aircraft.

It should be noted that the variable-stability airplanes have provided considerable such flight experience in such regions at the time they were not being encountered in operational service," says Korfman. "This flight experience has been widely distributed among pilots from Ames and other laboratories, to the Air Force, the Navy and aircraft companies."



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Developed under basic Link patents, the F2H-2 and F2H-3 Jet Flight Simulators are used in stationary and mobile units to help U.S. Navy pilots train for jet flight.

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## Cermet Application Process Developed

A rapid, economical process for applying chromium-based metal cermet coatings to metal bases has been evolved by the National Bureau of Standards' metalized surface laboratory.

Chromium-based metal cermet coatings have been used extensively in recent years as hard bearings for metal parts subject to severe erosion and abrasion.

The cermet coatings, developed by D. G. Moore and J. R. Griebel, are said to be resistant to thermal shock, oxidation, scaling, and softening at high temperatures, and to possess some degree of ductility.

## NAA to Build Fourth Nuclear Reactor

A medical nuclear reactor to be designed and built in North America by the National Aeronautics and Space Administration's Jet Propulsion Laboratory at California Institute of Technology in Los Angeles will bring to four the total number of atomic reactors constructed by NAA.

The sodium type reactor, built by NAA for Atomic Energy Commission research work, on schedule is expected to be the first of the reactor plant and the other at the Los Alamos Research Laboratory. A third, a sodium-graphite reactor known as the Sodium Reactor Experiment and financed partly by NAA and AEC, is scheduled to go into operation next year.

The new reactor at UCLA's Los Angeles Medical Center will produce gamma rays and neutrons for cancer therapy and is expected to solve a variety of other problems.

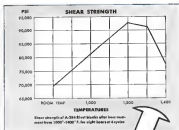
## Republic Engineers Off to Atom Schools

Republic Aviation Corp. is sending training groups to study two more chapters in specialized schools for the study of atomic energy aspects of aircraft design.

John Cargill, an associate engineer at RAC, has been assigned to the School of Reactor Technology, O-R Ridge, Texas, for one year starting in September. The predecessor of O-R Ridge, Walter Ritten is also an associate engineer.

Clifford Benninger, research engineer, will attend the first class of the School of Nuclear Science and Engineering of the Argonne National Laboratory, Oak Ridge, Chicago.

Republic's interest in nuclear aspects stems from the atomic bomb capabilities of its F-84E and F-86.



NOW—FROM DU PONT:

## NEW SUPERALLOY AIRCRAFT RIVET RETAINS STRENGTH UP TO 1400°F.

ONE-PIECE FASTENER IDEAL FOR JET OR MISSILE APPLICATIONS

Into shattering along at 1300 to 1400 miles above the earth—that's a picture of the new future recently shown by a leading design specialist. To help make that vision reality, Du Pont presents the A-388 Superalloy Aircraft Rivet—the strongest the world has ever made.

Then quickly installed, it retains its high strength—both tensile and shear—up to temperatures up to 1400°F. (See graph on shear strength above.) In fact, it retains its strength in strength in the "cycle," just as they are in jet applications. And, of course, the A-388 Superalloy rivet has all the timely advantages of a Du Pont Rivet. A one-piece fastener with nothing to break loose, it is easily set—open or blind—from the head side only. No backing bars or other fastening is ever necessary.

Superalloy is a metal combination especially designed to meet the needs of superheats, steady, dynamic, highly heat and corrosion-resistant, it is the ideal composition for jet aircraft rivets. In jet engines, guided missiles or any job where high strength with high heat resistance is required, use the new Du Pont A-388 Superalloy Aircraft Rivet. The ultimate information and specifications on this uniquely advanced development write: E. L. du Pont de Nemours & Co. (Inc.), Explosives Dept., Wilmington 98, Delaware. \*Items shown with experimental.



High setting temperatures make one problem: A-388 Superalloy Rivet. Rivet breaks the heat barrier only.

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## LETTERS

### 'Light' on Tacan

This is in consonance with your editorial "Light on Tacan Run" in the June 29 Aviation News, p. 181.

Your editorial goes on the impression that you have just discovered that Letter, and that you were busy, for the first time, to make a suitable justification for a program of "Tacan from here to the moon, and down with everything else."

First, you could have easily and quickly determined that that Letter is nothing worth reading to you opposite what your readers to believe, or so tragically significant. It was put in the public record during the course of the Congressional hearings on the subject, and was discussed at some length. That some counsel would bother to study it—would show you the true opposition attached to that Letter. Unfortunately, it is not the significance, the "important" as it is below in one part of it that you'd like to have your readers believe.

The House Intelligence and Foreign Committee, committee did not do a back flip over that Letter, and neither did the Military Operations Subcommittee of the House Committee on Government Operations. In those reports you apparently did your best look at the devastating document.

Your editorial appears to have more "fetched" the "important" up of light, with not having concerned yourself much with the main point. You on the document "gives the complete lie to the charge that the Committee, Department and the Civil Aeronautics Administration were unaware until shortly before the 1955 run reported that Tacan was being developed and would come under conflict with the new DME program. You yourself substantiated the construction of that statement and it's simply not accurate. Everyone knows that both the CAA and Commerce were aware that a highly secret thing called Tacan was being developed.

But a little before appearing would quickly have shown you that (1) Tacan was always highly classified (2) was developed to the civil aviation in being used and (3) the Commerce Department and Civil Aeronautics Administration were aware of it when it was under development, and hence could not even be discussed with anyone and (4) that the Commerce Department and Civil Aeronautics Administration were aware of it when it was under development.

It would only have taken you one phone call to determine that the military then, when they continuously a party to the development and implementation of VOR, DME throughout the U.S. as the Commerce System only complete and you could have easily determined that the military have been been participating in ACC interests and that the ACC has been developing.

Aviation Week references the opinion of the military on the issue raised in the magazine's editorial comments. Address letters to the Editor, Aviation Week, 229 W. 10 St., New York 36, N. Y. Try to keep letters under 500 words and give a genuine identification. We will not print anonymous letters, but names of writers will be withheld on request.



## Another DUNLOP FIRST!

**FIRST TURBO-PROP AIRCRAFT IN U. S. AIRLINE SERVICE**

# Capital VISCOUNT

AIRLINES



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Dunlop Tires hold every world's land speed record since 1929. In the air, Dunlop products are used on many of the world's fastest military and commercial planes.

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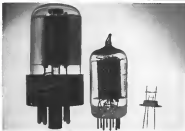
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Factory and Executive Offices, Buffalo 6, N. Y.





**RIGHTY MIGHTY**, the tube shown outside right goes in increasing threat to the long-established vacuum tubes in avionics equipment, as Avionics Week news indicates.

## Trend to Transistors Seen Slowed By Military Procurement Policies

By Philip J. Klaus

"Transistors of avionics equipment will be delivered as long as the ordnance services buy solely on the basis of price and delivery," an official of a major avionics firm tells *Avionics Week*.

Then, despite the many advantages which transistors offer the military, service procurement policies can slow down widespread use of such equipment.

In the present state of the art, transistor equipment costs more to develop and produce.

•To develop, because it involves learning a fresh design approach with considerable attention to the transistor's peculiar characteristics and operating limitations. Unit engineers become, as president of transistor circuit design in this, are at tube circuits. Transistorized equipment will require a longer time and development period.

•To produce, because transistor circuitry cost several times more than the vacuum tubes they replace, and several transistors would be required to replace one diode tube.

### Military Roadblock?

The military firm official cites two equipment which has been analyzed from the standpoint of advantages and

cost of transistorization.

By transistorizing one unit, the firm estimated its use could be reduced from 388 cc in to 15 cc in, while cutting power consumption from 54 watts to only 1 watt. However, the 64 transistors and diodes required to replace the 11 vacuum tubes would cost nearly \$500, compared to sub. \$50 for this tube in the original model.

The other unit, which occupied 1,584 cc in, and consumed 322 watts in original vacuum tube version, would occupy only 97 cc in and consume only 5.4 watts in transistorized form. However, the 792 transistors and diodes required would cost \$2,622, compared

to *Avionics Week* survey (July 15, p. 30) showed that transistors are replacing 20% of the tubes in avionics equipment now under development by 1950, and the figure is expected to rise to 30% by 1955 and 40% by 1957.

Transistor and resistor amplifiers already will displace 30% of the tubes in equipment now under development, with the figure expected to rise to 40% by 1957.

Then, second, and controlling factor, analyzing the many diverse factors which may affect this trend in transistorization.

to sub. \$200 for the 74 tubes in the original model.

These limitations, too, a producer both of transistor and avionics equipment, says that typical savings produced by transistorization are: a 90% weight reduction, 80% size reduction, and 95% cut in power consumption.

Where development or production contracts are awarded on the basis of low bid, and where the user does not require transistorization, the military procurement officer cannot justify paying a higher price to get transistorized equipment. This is despite the fact that for avionics equipment, the smaller size, lighter weight, and much lower power consumption would more than make up the difference in price over the equipment's lifetime.

The dollar and cubic value of transistorized equipment can be appreciated solely from the standpoint of its reduced power consumption, and hence lower heat dissipation, which runs 1/10 to 1/40 that of vacuum tube equipment. A Douglas Aircraft study indicates that in a typical Mach 1 attack airplane with 4 in. of heat generated by severe (vacuum tube) equipment can be dissipated, an extra 174 lb of cooling equipment and extra fuel must be carried to do the job.

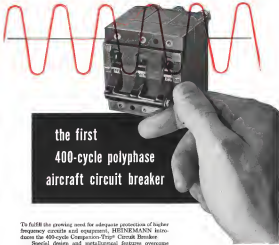
When multiplied by a "growth factor" of 18, this 174 lb of cooling equipment and fuel increases airplane gross weight by 1,540 lb, if the same performance is to be retained. Based on an average manufacturing cost of \$40/lb, this avionics airplane cost by around \$58,800, Douglas estimates (AWW Aug. 8, 1954, p. 45).

Recognizing that some of the tubes cannot be replaced by transistors, the use of transistors wherever possible should make it possible to cut required cooling equipment and fuel weight, and resulting airplane growth factor, cut to 4 in. in the present Douglas figure. On this basis, transistorization appears to offer a savings of \$45,800 to \$54,000 per airplane, but the added cost of transistorization—which should not exceed a few thousand dollars.

A Navy spokesman in a recent speech strongly urged the avionics industry to proceed positively with transistorization. He added that he expected that the reason there had not been greater progress was due to "short shorts on the part of the designers."

AVIONICS WEEK survey of 19 avionics producers reported here last week (p. 38), indicates little activity in the major part of the industry. This suggests that the military services should check into their own procurement pro-

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tens to be sure that these provide suitable incentives to aviation firms to transistronize, or at least do not penalize those who propose to do so.

#### Transistor Prices Down

There appears little doubt that the transistor's present handicap of higher price is only a temporary condition. In recent months there have been significant price cuts by several leading producers. The industry is fast turning up sophisticated assembly and processing techniques to enable it to slash prices further. A GE spokesman estimates that transistors will be competitively priced with tubes by 1957—cheaper than tubes by 1958-61.

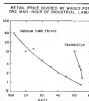
A recent analysis, made by Dr. William Shockley, a Bell Telephone Laboratories scientist and transistor expert, indicates that the price has dropped much more rapidly with fast since the invention of transistors in 1945 than has the price of tubes since their invention 40 years ago.

In his analysis, Shockley outlines the effects of increased wage levels throughout the years in order to show precisely the effect of increased know-how and manufacturing skill on tube and transistor prices. Shockley's comparison, shown in curves shown, confirms, therefore, plots actual price divided by wage for one million of industrial labor. The curves, furnished by courtesy of Dr. Shockley, were first presented by him in an acceptance speech when he received the Cresskill Prize of the National Academy of Sciences last year.

In addition to the fact that transistors have lower parts and that require fewer low-skilled workers than tubes, Dr. Shockley points out another interesting difference which may eventually give transistors a price edge: tubes require a longer time to be used over a 10 percent range of operating values by changing the bias level than does a vacuum tube.

For this reason, Shockley expects that current designers will be able to build their circuits around the fewer transistor types than the number of vacuum tube types now required. This will mean higher production of the fewer transistor types, with resulting manufacturing economies. It will also have important layout implications for the silicon services.

Although the industry still produces nearly 200 types in many remaining type tubes as transistors take over, GE's estimate is an estimated 14 to 25 million transistors; the rate of growth of transistor production suggests that the semi-conductor age is on a collision course with the not-too-distant future, according to another set of curves prepared by Dr. Shockley (see right).



**PRICE COMPARISON**, plotted to illustrate the effect of changing wage rates, suggests that transistors soon will cost less than tubes.

Endorsement of the transistor industry's confidence in an expanding market can be found in the calls for action at announcements of expanding facilities and mechanization by such firms as GE, Motorola, Texas Instruments, Sylvania, Raytheon, Westinghouse and others.

#### Transistor Reliability Up

During a debate on the subject of how soon transistors might replace vacuum tubes at the recent Electronic Components Conference in Los Angeles, CSAR's Maj. Gen. C. S. Brown said:

"We have been waiting for some reason for use of our fast engineering improvements to produce fast control systems which do have a few transistors scattered throughout them. It is my opinion," the Deputy Chief of Staff-Military maintained, "that the reason we have not been able to advance the production date of this highly important piece of equipment is due to the erratic and unpredictable behavior of transistors."

But since the first day production



**PRODUCTION COMPARISON** of tubes and transistors, plotted on logarithmic scale, reveals transistor output is growing fast.

of almost countless transistor life was guaranteed by early troubles, the device has been under a cloud of suspicion as to its reliability. During the past several years, however, manufacturers have learned much about the cause and cure of transistor diseases, while equipment designers have learned that transistor reliability, like that of tubes, depends in part on their circuit designs. Finally the best evidence of much improved reliability comes from General Electric's recent action in extending the guarantee period on its test tubes from 90 days (standard for vacuum tube tubes) to one full year. As five other producers of present high transistor reliability include:

- 0.1% failure/1,000 hours in a Bell Labs digital computer, compared to 0.7% for tubes.
- 0.25% failure/1,000 hours in Boeing jets, compared to 0.5% for tubes.

Plenty's experience in manufacturing surface-mount transistors provides a good example of how reliability goes up with production experience. Following are life test failure rates which Philips experienced in succeeding quarters of 1954:

- 45%/1,000 hours.
- 25%/1,000 hours.
- 12%/1,000 hours.
- 0.6%/1,000 hours.

#### No Longer "Around the Corner"

A year ago, *Aviation Week* asked the chief engineer of a major aircraft firm what his company was doing in the way of transistronization. He replied: "Very little. We figure that transistors are still far years away."

Today, that same firm is pushing transistronization hard. One major factor behind the switch was the production availability, increased test volume, of high transistors, along with other factors, which opened up their use as a vacuum replacement.

The belief that transistronization will give some years off against tubes in the light of *Aviation Week's* survey.

#### Avionic Bulletins

A Transistor Unit described with its three different types and detailed in Bulletin TCU-1000 (4 pp.), Service Department of General Electric, Burlington, Mass. (Circle 10).

A General 1000 series, a general purpose transistor, which offers a temperature range of -55°C to +125°C, is described in Bulletin TCU-1000 (4 pp.), Service Department of General Electric, Burlington, Mass. (Circle 10).

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## FLY WEATHER-WISE

These weather maps prepared in consultation with the United States Weather Bureau.

# HURRICANES



**B**E PREPARED for the incoming, revolving weather systems between June and November in the Northern Hemisphere.

The hurricane (called typhoon in the Far East) is a swirling mass of swirling over clouded sea with destructive winds of 75 mph velocity or more extend outward from the center for a distance of 50 to 300 miles. Not only hurricanes begin to affect the Gulf of Mexico in June, gradually shifting to the East Coast by September and October as shown on map at left.

Hurricanes move fairly slowly (about 20 mph) before they move to the north and northeast, but usually accelerate to 30-35 mph after they are headed north and as they get to the

higher latitudes off the East Coast they may move as fast as 50 mph.

If it looks like your plane will be in the path of hurricane winds, it's wise to have a gasped up and ready to move. If you are unable to move it from the storm's path, listen to the Weather Bureau's hurricane advisories and lead it into the wind, steering all control surfaces. To it down is an approximately level attitude. This can be done by digging below the main gear and elevating the tail, if necessary. Near the end of the storm, when the wind blows counter-clockwise around these areas, as directions depends on which point quarter ahead you



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**Avcon One-Way Restrictor Valves.** Available with either male or female JGD type connections. Restricted flow rates from 8 GPM down to 12 GPM for any operating pressure up to 500 psi. Transmissible for hydraulic fluid, oil, gas, etc. and other fluids non corrosive to steel and aluminum.

Also **Avcon Two-Way Restrictor Valves**, 6000 psi high pressure Restrictor Valves, 4000 psi low pressure Restrictor Valves, Absolute Pressure Relief Valves.

## NEW AVIONIC PRODUCTS

### Components & Devices

• **Subminiature capacitor.** Type 118P, can be operated at 125C without voltage derating, according to manufacturer. The standard paper capacitor, designed to meet on momentary requirements of MIL-C-21A, has self-healing dielectric and glass-encapsulated seal. Engineering Bulletin 224 gives application data. Sprague Electric Co., 327 Marshall St., North Adams, Mass.

• **High temperature resistor.** called Polaron is metal film type which repeatedly maintains its 1% tolerance under high humidity conditions and constant loading up to 120C. Temperature coefficient is quoted at 150 ppm/deg. C. Clarys come in 1/4, 1/2, and 2 watt sizes. Polyscience Research & Development Co., Inc., 332 Tillary St., Brooklyn 1, N.Y.

• **Ultrasonic chopper.** Type 300, rated for 2,000 hours life, operates from 6.3 v d.c. and generates 400 cps. Miniature chopper is rated for operation between  $-54^{\circ}\text{C}$  and  $200^{\circ}\text{C}$ , at 10,000 ft. alt. tide, and operates worldwide 100C.

switching shock. Switching phase angle is  $85 \pm 15$  deg., dwell time on each pole is  $145 \pm 20$  deg., and balance between dwell times is  $0 \pm 15$  deg. The 38013 chopper requires no solder for 1 sec. at from 0.1 ms. to 100 ms. Avcon Products Co., Middle River, Baltimore 20, Md.

• **Thin-film capacitor** has type of integral chassis mounting which enables user to withstand high shock and vibration. Load resistor and bias not visible.



capacitor to chassis. Unit operates over temperature range of  $-55^{\circ}\text{C}$  to  $175^{\circ}\text{C}$  or up to  $200^{\circ}\text{C}$  in special order. F. R. Mulvey & Co., Inc., Indianapolis, Ind.

• **All metal vibration motor**, which manufacturer reports meets all requirements of MIL-C-1721B, has resonant frequency below 10 cps with a magnetic flux factor of less than 10 at resonant, and with no double resonant peaks. F. R. Pugh & Co., Inc., Electronics Div., Hawthorne, N. J.

### Test Equipment

• **Tube characteristic curve tracer**, Type 575, gives a visual display on a cathode ray tube of operating characteristics of vacuum tubes including families of curves, under a variety of tube operating conditions. Teknomic, Inc., P.O. Box 531, Portland 7, Ore.

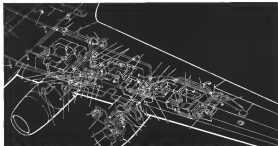
• **Cold beam counter**, high accuracy, also distinctive, measures number of ions, fission or non-magnetic fission with a reported accuracy of 0.1%. Can be placed over test rod and its beam count (as well as a standard coil mounted within the equipment). Unit is available in three models depending on range. Sundown Scientific Instrument, 1810 Grant Ave., Philadelphia 15, Pa.

• **Transistor characteristic curve tracer**, plots semiconductor levels of curves on standard laboratory d.c. microammeters, to permit comparing, checking and selecting of transistors or to spot faulty units. Accuracy is reportedly .3%. Magnetics Associates, Inc., 632 Union Ave., New York 35, N. Y.

• **Electronic digital counter**, Model 521A, for measuring frequency, speed, rpm, random events, measuring at rates of 1 cps. to 125 kc., provides direct base-10 numerical reading. Unit with kit

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"Superior" Tubing meets all these requirements: **light weight; close tolerances; workability; ability to withstand vibration, shock, high temperatures, and high pressure surges.**

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**Ability to Withstand High Temperatures:** Check valves for use in the inter-rocket injection systems of jet, fuel and oil burn forward of the thrust jet engines (jet-rocketed, thermocouple tubes).

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5475 **Edco** Igniter. Hewlett-Packard Co., 275 Page Mill Road, Palo Alto, Calif.

### Laboratory Equipment

• **Dragage filter Model 137 AB**, one hourwork adjustable with work pressure gauge and 24 lb. effective attraction outside the gas line; portable high and low cut-off frequencies to be made previously set from 20 cps to 200 kc. Calibration accuracy is 10% or 5% on special order. **Kalaflex Instrument Co.**, 550 Mass. Ave., Cambridge 38, Mass.

• **Protonic test series of Type 116**, provides a high-gain, low-noise 50 mc. amplifier, a secondary standard of attenuation, and means for testing the RF output of a wide variety of microwave tubes. When combined with suitable feed amplifier, the new antenna device can be used as a sensitive microwave detector. **Analogic Instrument Laboratories, Inc.**, 160 Old Country Road, Mineola, N. Y.

### Transducers

• **Mini diameter coil, Type 1317**, employing thermistor element for remote sub-miniature heat detection. Its sensitivity of 90 volts/mil when shunted by a 3 megohm amplifier impedance, and a time constant of 12 milliseconds, according to manufacturer. Spectral response is 1 to 12 inches with standard window, 1 to 25 inches with

other windows. Type 1340 coil for use where "weak" heat from air jet or action by high exhaust velocities is a problem has a sensitivity of 150 volts/mil and a time constant of 15 ms. **Servo Corporation of America**, 2020 Resnick Triangle, New Hyde Park, N. Y.

### SWA Uses Low-Cost Ignition Analyzer

A new model ignition analyzer that costs about half as much as similar equipment is being used by Southwest Airways on its DC-3s and Martin 4-0-3s.

The portable unit, called the Woodstock Ignitionscope, is used by SWA as a maintenance check.

Chief Engineer D. G. Driven says that since SWA began using the unit in maintenance checks, not a single plane has had a trouble-free delay due to malfunctioning magnets or spark plugs. Prior to use of the unit, the airline experienced at least two delays a week from ignition troubles.

Driven estimates that SWA will save thousands of dollars each through use of the instrument.

Manufacturer J. W. Woodstock, Inc., 1400 Broadway, Newark, N. J., Albany, Iowa.

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COLLEGE POINT, NEW YORK

**Superior Tube**  
The big name in small tubing

## Stretch-Former Eliminates Milling

By Irving Stone

**Tenneco, Calif.**—A new stretch forming technique has been developed to allow contouring of structural parts in compound longitudinal taper.

The method characterizes the need for first stretch forming a piece of constant cross-section and then following that by complex and expensive milling operations to attain the tapered cross-section in the case of a wheel.

Considered applicable to tapered axles, trunks and other cast and wrought-iron configurations formed from constant thickness or tapered sheet, the new compressing process is known as Kairball progressive compression stretch forming.

It is patented for application to a new line of machines now in the development stage at Shindler-Gray, Inc., the West Coast division of W. W. & C. B. Shindler Co., New York.

Basic patent application for the process has been made by inventor D. W. Kairball, Northrup Aircraft's general superintendent of tool operations, who has been assigned to T. W. & C. B. Shindler Co.

### Efficient Shapes

This new process will enable the designer to create efficient structural configurations without imposing difficult production and tooling problems on the shop floor.

Normally, creating a tapered part involves lathe, or profile milling and a considerable amount of handwork to correct for deformation during the tapering process. It means over the machine involved rules out the tapering in the curved part, forcing the designer to accept a weight penalty.

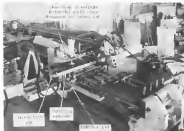
With the new approach, making the taper is done in the first—relatively simple job—and the curvature is put into the tapered part in a final operation.

### First Projection

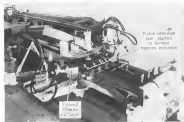
Shindler is projecting design of its first machine incorporating the compression technique features in next Northrup's superpropeller shaft stretch forming tapered and aerodynamic structural parts. Subject to Air Force and Northrup negotiations, a 16-lb. part, 12-ft. maximum cross-section of the machine may be in operation early next year. Cost would be about \$50,000, it is expected.

Here's how the compression-stretching process works, as developed by

Available in 1000 lbs. or 2000 lbs. capacity  
for forming parts in  
compound longitudinal taper



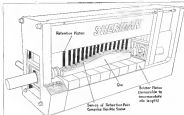
EXTRUSION AWAITS FORMING in E-60-12 with low compression pressure members



PART IS STRETCH-FORMED with all of the machine's piston extension pads applied



BEFORE AND AFTER Jaggle in formed part (right) was put in during the stretch.



PROPOSED DESIGN of compression stretch forming machine to produce tapered parts.

Shindler-Gray from Kairball's basic invention.

• Tapered shafts, for example a welded cylinder with top flange and end cap, is placed in the jaws of a stretch forming machine incorporating compression members. These members are driven in tandem with their corresponding pistons attached to the individual compression or reversible fluid plating.

• Performing of the extrusion process is reported in Shindler's position (see tool control (AWM 21 p. 54)). This position the part is held within a template to achieve uniform elongation in the part.

This control rather prevents the stretch-forming of tapered parts. Shindler says. Without a pre-pull would have to be a function of hydraulic pressure which introduces pressure, rather extremely difficult to control for accurate specific production pieces it is desired.

As the stretching operation starts, the tapered part tends first at its surface cross-sectional area and as it yields a neck-throat. This increases the section's resistance to stretch and, in turn, the adjacent element yields and also a knockout to a work finished condition.

This action is repeated along the longitudinal axis until the positive pressure control indicates that the piece member of elongation has been achieved under the still-increasing bearing area of the first section piston (first machine stroke) supported by Shindler would provide four-square extrusion pistons pads.)

• Retraction pistons now moves down, leading the part surface to the die, preventing an further stretching on the lateral portion (its length) of the part.

The stretching and holding operation is reported for the full length of the part.

• Shindler-Gray has successfully produced parts in a developmental test setup utilizing four section pistons in a conventional stretch forming machine.

These parts have been 788W Tensile, having a 24-in. cup and 2-in. reinforcing leg. Cup had been tapered 100 to 100 in. per linear inch, from an original thickness of 135 in. Leg had been tapered 1 in. per foot from an angle of 3-in. long.

The 735 material was selected because it was considered a difficult alloy to form. Shindler-Gray engineers use the process applicable to all steel or cast parts, having stretch formed.

Results of tests to date have proven that parts may be reduced in size by as large as 40% per linear inch and be successfully distributed in the compression stretch forming Shindler-Gray system.

Another tapered shaft can be obtained with the extrusion piston in the production of parts having long, or long heads and end-of-plane centers.

## Stock Transactions Reported by SEC

Transactions of the Russell Foundation, acquired 125,000 common shares of Shindler-Gray Inc. stock to utilize a total holding of 493,217. Securities and Exchange Commission reported in its Securities Exchange Act for the period May 11-June 10.

Other transactions included American Airlines Inc. (United of 1,000 common shares for \$100,000, reported in its Securities Exchange Act for the period May 11-June 10. United of 1,000 common shares for \$100,000, reported in its Securities Exchange Act for the period May 11-June 10. United of 1,000 common shares for \$100,000, reported in its Securities Exchange Act for the period May 11-June 10.

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PAGE 12 & PAGE 100





# D & B RESEARCH

## SMALL AXIAL FLOW BLOWERS

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## Dean & Benson Research, Inc.

14 RICHMOND ST., CLIFTON, N. J.  
Gregory J-1000

### Aviation Week Picture Brief



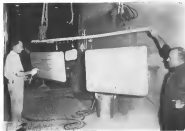
## Balsa Forms Mold for Short Run

Novel use of balsa and paper to construct a mold for an inflatable latex bag was developed by engineers at Glenn K. Martin Co. for pressure testing parts of the new XP5M-1 SeaMaster.

It was a short-run job as permanent mold was out. Instead, balsa wood was used for a frame, that was then covered with polyethylene-coated paper. Liquid latex was spread over the paper to form the sea-pac inflatable bag.

With the bag formed, technicians cut a small slit so they could slide inside the bag, crush the balsa form and extract it in wash of paper and balsa. The rubbery latex was then dried and the slit reslotted.

Next, latex was spread to form the thickness to the required value; then the bag was again dried.



## BUSINESS FLYING



NAVIGONS AND C-46s typically needed's first of turbos used for equipment evaluation.

## Meteor Offers Flight Test 'Package'

By Erskine J. Hiltner

After storages of flight test facilities that are declining equipment manufacturers' development to production cycle are being overcome by a new business, active liaison of Meteor Air Transport, Teterboro, N. J.

The reason is a growing need for short-term, in-flight testing facilities. Meteor's new Equipment Flight Test Division told Aviation Week:

"The aircraft we have on hand now will add about \$150,000 to Meteor's 1955 gross," he said "and we could hit \$500,000 before the year is up." The new operation has been given a lot of help and assistance only a few months ago.

Right after—since 1951—of EPTD a business comes from military aviation equipment testing, the remainder is constructed by suppliers in the business aircraft market.

The former company a vast power generation of small firms. By weight of numbers and public output, they have overwhelmed the limited supply of aviation flying facilities, already heavily engaged on expanding service requirements.

"One of our first clients was told by Wright-Patterson AFB that he would have to wait a maximum of six weeks before the Air Force might schedule

his equipment on one of their shops. We had a DC-3 flying with the equipment in one week," Kossowidze said.

New flight's price in the job of taking the modified product up for another 150 by beginning in September.

"I've been told at Wright-Patterson that companies have been asking officers if they can pay pilots facilities available, since the military has been tied up in its current program."

In addition to signing up individual manufacturers Kossowidze sees USAF as one test problem in offering another factor for participation by EPTD. He is trying to get the service recognized as a USAF-approved civilian flight test agency so that he could bid on parts of the service's backlog. The right of the company to cover Air Research & Development Command studies. He says that the Graphics Research Department at Cambridge Mass., has shown considerable interest in using the service, particularly for weather research projects.

### EPTD Services

Kossowidze told Aviation Week that Meteor can handle one flight program for about 60% of what it costs USAF.

He is trying also to persuade Air Force to approve a plan whereby a contractor, who have development program is being tied up because of unavailability of a military facility, could get a one test location permitting the same

factor in use Meteor's facilities.

Equipment Flight Test operates a flexible pattern of services built around the basic Meteor wind-tunnel fleet and now have supplemented with new aircraft being purchased especially for use in turbos.

Under this system, some of Meteor's transports had a double life, testing equipment by day, flying cargo by night. Occasionally they fly cargo and test equipment simultaneously.

A manufacturer may want to replace for each a few hours a day. If the equipment requires modifications, such as a engine modifications, he needs EPTD the necessary drawings. The design selects an available airplane and puts Meteor's shops and personnel to work testing the data and satisfying the accuracy fittings and power supply to drive the equipment and attendant recording devices.

The airplane is ferried to the customer where the equipment can be installed for the flight program. At the end of the day's flight, the equipment can be removed and the airplane returns to Teterboro. It may be set up for a cargo run that night. The sort of a contract helps Meteor get high utilization out of its transports. It hopes this will allow lower cargo rates.

### Test Costs

Under the arrangement, the manufacturer pays about \$250/hr. for a C-46 (plus wind-tunnel charges) and one-dollar per mile towing fee. A DC-3 costs about \$200/hr. in addition to these charges, a B-25 approx. \$100/hr. the same. A Navion runs lower \$15 per hr.

If the manufacturer wishes, he can have the airplane and crew based at his facility for the course of the test program. EPTD's package for this includes all maintenance, fuel and oil, crew, insurance and other long expenses, insurance, landing fees and insurance certificates and licenses. Costs on such a contract work out approximately in dollars.

• C-46—\$30,000 per month covering 30 flying hours. Over this time it runs \$175 a flight hour.

• DC-3—\$10,000 per month for 30 flying hours. \$175 per hour after 18 hr.

• B-25—Same as the DC-3.

• Navion Super \$50-\$1,000 per month, and \$15 per hr. after 18 hr.

Another service is called a detached rate contract. Under this, a manufacturer can have Meteor's equipment and its regular cargo rates at \$50 per hr. plus maintenance and equipment manager. A typical example is business aircraft radio equipment. The manufacturer becomes a co-owner of the C-46's, normal radio, gets the Meteor operator's training, a moving log

to the equipment's performance results. If it is transmitting gear, it transmits basic, once with the standard equipment, once with the test set explaining to the tower that it is a test. Operating personnel also write up an informal personal evaluation of each year of equipment.

## Modification in 12 Hr.

Kramerer recalled a case where a radio equipment maker decided to run the solenoid test just before shipping production units out to distributors. The equipment failed during the Motest flight and investigation showed a drama failure that was cor-

erated before shelves were loaded with the new product.

According to Kowalski, the flight test division can have an airplane ready for flight in 12 to 18 months, including CAA approval. He notes that there have been no problems regarding orbital security clearance for Mission personnel. Generally speaking, there have to be no problems with the equipment they are installing or testing. They merely get an explicit order to take a "package" and then they fly according to specifications. The contractor's personnel are the only ones concerned with meeting the component and its performance.

It is obvious that Equipment Flight Test is getting set for a long haul. The Division spent approximately \$15,000 in recent months for additional sleep and tribed servicing equipment. Another \$50,000 is earmarked for further equipment purchases.

The aircraft lineup is due to be increased EFTD once loss of Natick's two C-46s that the demand for these airplanes, because of their two-engine, low-wing engines that permit operations at 23,000 ft., will soon outpace their availability. Natick President Robert Morris and chief flight test engineer John Schwan have been overcautiously shopping for two more C-46s. With a fleet of eight Commandos, greater flexibility in planning flight test and cargo operations will be possible.

On B-27, month acquired, a school ided in need to be put into shape for its new job. Karasides indicated that he may need two B-27s. The company has leased a helicopter for one test contract, but sees a definite need for one of these vehicles and plans to buy one B-27.

Macros, probably will get a Bonus for excellent transportation, being in Nissan Super 260 and going FTTT, two of them light planes to test the macros' overall cabin equipment, light instruments and navigation equipment.

Bombardier refused both requests. Edwards said that a survey he has made in the Eastern U.S. shows that of 100 equipment manufacturers he contacted, 15% and then had an immediate recommitment for the private jet facilities. Some were already have signed up with ETD and others are negotiating contracts. Another 70% told him they would need such service within the coming year, and they would contact him when their equipment has reached that point.

One prospect will require a conversion of an aircraft to flight test all production equipment he said.

He expects that in the next 90 days the company will get three big contracts in the New England area that will require setting up office and waste-water and crew facilities there.

### Executive Ventura Cruises at 300 Mph.

A reformed Lockheed Vertina that flies at over 300 mph for 2,300 mi. straight at normal cruise power, carrying 14 passengers has been developed by Howard Aaga Sverre, Inc., San Antonio, Tex.

The "Super Ventura" is powered by two PW5A 3,180-Mhp. and carries 1,300 gal. of fuel.

Vesta's normal fuselage has been extended, increasing structural stability, the modification firm reports. A new tail boom system is fitted to the

<sup>4</sup> Super Venturi<sup>®</sup> controls to reduce wind for back patients.

A good arch has been built into the bridge base to lessen transmission of vibration from the oscillator axis.

Initial "Super Venturi" has completed its flight test program and production evaluation are being built.

## PRIVATE LINES

Production of Canada 488 tons to go. Navors has reached one-third of the capacity of its new plant at Calverton Municipal Airport. The Navors conversion is expected to reach one-third "in the near future."

Three Bell 60C's are being delivered to Colorado Interstate Gas Co., Colorado Springs, for transporting Lys super-tan, procured during construction of a 380-in. 22-in. pipeline being laid in the East. First copier has been delivered, second is due five months and the third next March. Two will have right lift equipment. — Pughin Construction & Drilling Co., Camp Hill, Pa., is getting a second Bell copier this month.

**Executive** Lougier has flow a recently 2,570 sq. dm. Green Glider, Newfoundland to Paris in 8 hr. 10 min. Plane, owned by international owner Charles B. Wrightman, features the world's largest aircraft installation of a Radio Telex Path system, especially designed for secure navigation at high latitudes. It can also serve as the direct control element of an autopilot.

Two de Havilland-Canada Beavers have been purchased by U. S. Department of Justice, Immigration and Naturalization Service to suppress border patrols. Planes were sold by Bids Co., Inc., Montreal, N.E.

Large business aircraft service center is scheduled to open this month at Dorval Airport, Montreal, Canada. Timmons' Business Aviation Center will be open 24 hr a day for complete maintenance, including repair, paint, general overhauls.

Executive aircraft leasing service, offering single or two-engine equipment package complete with crew, has been established by Executive Fleet, Inc. Love Field, Dallas, Tex. Expansion of the current fleet is planned. Present equipment: Two Lockheed, a Beech Twin Bonanza, two Beech Bonanzas and a Norson Bad Oil Co. has recently assigned its aircraft to the firm to operate.

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ALUMICOAT 100 is a wet-lay process that can be applied to steel, aluminum, titanium, and other high-temperature alloys. It is a two-part system consisting of a base coat and a top coat. The base coat is applied first, followed by the top coat. The top coat is a thin, flexible layer that provides excellent protection against oxidation, corrosion, and erosion. It can be applied to both new and existing components.

ALUMICOAT 200 is a dry-lay process that can be applied to steel, aluminum, titanium, and other high-temperature alloys. It is a two-part system consisting of a base coat and a top coat. The base coat is applied first, followed by the top coat. The top coat is a thin, flexible layer that provides excellent protection against oxidation, corrosion, and erosion. It can be applied to both new and existing components.


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
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- For remote control and power drive of instruments, pistons and accessories.
- A complete range of sizes and types for every service.
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
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## NEW AVIATION PRODUCTS



### Low-Noise Aircraft Inverter

Model 36-241 aircraft inverter, rated at the classic 1500 W. Maximum weight 41 lb. and mounted at 2,210 in. at 15,000 ft. Unit has electronically controlled carbon poles which require power for about and require field, then voltage and frequency regulation are a function of allowable specification value, resulting in a constant in "noise" level of noise source, the noise reports.

The inverter is self-contained and will carry 1,500 in. at 15,000 ft. single phase, the manufacturer states. It measures 14 x 9 1/2 x 7 1/2 in. Lehigh Electric Co., 1580 Webster St., Elgin, Ill., Ohio.

### New Production Machines

These new machines, of interest to the aviation industry, will be among the highlights at the Machine Tool Show at Chicago's International Am. Exposition, Sept. 8-17.

#### Loaders

- Type K universal cylindrical grinder 12 1/2 in. x 5 1/2 in. x 10 in. (maximum speed, 100 rpm) automatic speed possible in either direction. Grinding accessories are not included. The universal wheel head which drives on a ground and flat run to provide accurate response to the load mechanism. A spring loaded wheel head drive is included in standard equipment.
- No. 125 automatic grinder for automatic work loader and unloader.



making the grinding cycle completely automatic from start to finish. It can grind three diameters on an automatic shift at a rate of 250 pieces/hr. with work back ground to tolerances within 0.0005 in.

- Type K 6018 in. and 10036 in. plain cylindrical grinders feature high rigidity obtained from a one-piece box, vertical bed casting with thick walls. Spindle speeds are from 54-200 rpm.
- Automatic loading, grinding and unloading will also be shown in action on a Lehigh 10040 in. D1W multiple wheel hydraulic grinder.

Lehigh Tool Co., Wrentham, Pa.

### Pratt & Whitney

- Fine optical meter table, 24 in., incorporates an early and precision optical system using a graduated glass metric disk to obtain linear for accurate settings. Optical methods also will divide each of these units into 500 equal parts for direct readings to one second of an inch. Readings are equipped and permitted on a view of 1/2 in. has 500 div. adjustment of the optical axis.
- Synoptic multi-dimension gaging machines simultaneously inspect to 50 physical dimensions and can be adapted



### Stainless Quick-Release Clamp

Quick-release clamp designed for aircraft high temperature applications has stainless-steel mechanism making it possible to tighten the clamp in the nose rack, that is, latch, using force in a tight area, the rubber points out. Unit is used to couple bulk with entry process and material specifications. The release mechanism is also available on V-bush design and a variety of special applications stores, the manufacturer reports.

Secord's Products Corp., 3995 Lakeland Blvd., Wickliffe (Cleveland), Ohio.

### ALSO ON THE MARKET

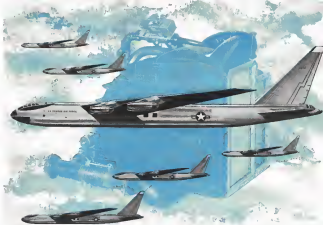
Double fabric H-3 high elastic Fiberglass reinforcing material for use in critical surface laminations including aircraft parts, a sheet to retain strength and uniform thickness of stretchy, tension—Duroflex, Inc., Dept. H-375, Mahwah, N. Y.

Schlenker's look left track with center control has 5,000 lb. capacity and is 15 in. wide for automatic work. Available with 60 in. ball wheel left right—Hoford Parker Electric Co., Cleveland 5, Ohio.

Liquid epoxy hardener EPT and EPT-12 are recommended for use in applications where high heat properties are required, such as in laminates, form-fused bonding, encapsulation, bonding and the like—Chemical Process Co., 500 Spring St., Roxbury, Conn., Calif.

Seven-power measuring magnifier for industrial use has scales for checking rods, bar thickness, angles and surface distance. Magnifier built in threaded, permitting accurate response focus—Burch & Loomis Optical Co., 615 St. Paul St., Rochester, N. Y.

Kalon F. molded and in a d. sizes from 1/4 to 5 in., and tubing with thick-



## STRATOS

### AIR-CONDITIONS THE NEWEST USAF BOMBER THE EIGHT-JET BOEING B-52

The Boeing B-52 jet bomber entering operational service with the Strategic Air Command this spring becomes the world's first heavy jet bomber to go into service.

Joining its medium jet bomber teammate in SAC—the Boeing B-47—the B-52 "Stratofortress" greatly strengthens America's Air Arm. A high flying, high speed heavyweight with a range longer than that of any other operational jet aircraft, it is destined to be the backbone of SAC's striking force for some time to come.

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## AVIATION SAFETY

### CAB Cincinnati Collision Report

## DC-3 Intruded Into Control Zone

### THE ACCIDENT

On 4964, Jan. 25, 1968, a Trans World Airlines Martin 40-2A, N 92121, and a Douglas DC-3C, N 9986, owned by Cessna, Inc., collided near the Greater Cincinnati Airport approximately two minutes after liftoff of the TWA flight.

All 11 persons aboard the TWA aircraft and the two pilots, who occupants of the DC-3, were killed. Each aircraft was destroyed as a result of collision, ground impact, and fire.

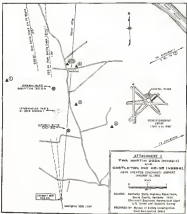
### HISTORY OF THE FLIGHT

TWA Flight 4964 departed Canton, Ohio, airport at 9:00 am on its scheduled flight into Cincinnati, Ohio, with a scheduled stop at Dayton. The crew consisted of Capt. James W. Gurnea, First Officer Robert R. Caldwell, and Captain Eugene A. Stennis. Gross weight of the aircraft at liftoff was 15,771 lb. at

usable 40,000 lb. and the load was properly distributed with regard to center of gravity limits. The flight was cleared for a night takeoff after liftoff from runway 12. At 9:04, controllers in the tower observed the crash. Kenzie Tower, TWA on-air line, [ ] reported in a second time of view. The crash signal was heard for first or two seconds after the crash signal.

Several attempts were made to contact the flight in the next few seconds. The controllers then saw a flash of fire and smoke rising from the ground about two miles west-southwest of the tower. When a short time it was learned that the Martin 40-2A was involved DC-3 had collided.

Between 9:15 and 9:23, Capt. Arthur A. Woldhausen, pilot of the DC-3, was contacted several times at the Radio Creek, Ohio, Airfield. Various Cincinnati Airport Station for various points along the route Radio Creek in Lexington, Ky., and Newark in Miami, Fla. Capt. Woldhausen advised the station about what happened. This earlier information that he was going to



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## • SAFETY

Levinson to park on escape passages and then proceeding to Eads. He recalled that he would proceed in accordance with Visual Flight Rules as Levinson said it the weather cleared or would could be a light for an RW clearance.

The stricken propeller fell from the aircraft at 1770, just before it took off. The sighting of the aircraft ending at Battle Creek. The flight was ahead of and ending was 1,000 feet and was reported to Eads's pilot report on taking after taking. The pilot replied that he did not believe he would get that high but would do it. He did. Information on the weather said, direct sightings, and Eads was transmitted and the flight acknowledged the message. They were the last radio contacts. When Capt. Workman was in the air, the station that showed that the aircraft was being checked in the map by the co-pilot, Edward G. Ayers.

No radio facilities along the route were contacted by the pilot of N 9988 and no flight plan was filed before departure or in the air. The primary flight plan of N 9988 in the Cleveland area was unknown to CAA Air Route Traffic Control and the Cleveland tower.

**INVESTIGATION**  
Immediately after the accident, when notified by the tower, the U. S. Weather Bureau office at the airport administration building took an observation. This report, designated as Report No. 4, was completed at 0807, only three minutes after the accident. Conditions were reported as: Ceiling overcast 100 feet variable, visibility variable 4 miles, light freezing drizzle, temperature 35, dewpoint 25, wind light west, 10 knots, altimeter setting 29.99 inches, pressure-tendency 700 feet variable to 900 feet.

The accident occurred within the boundaries of the Greater Cleveland Airport control zone, which is 20 miles in diameter with the center of the airport.

The main portion of the Martin wreckage was about 21 miles west of the airport control tower and approximately the same distance from the northwest end of the runway 21 station for 600 feet on both sides of a gully.

Examination of the Martin wreckage showed that the solid wing was partially severed. The wing was about 12 feet from the centerline of the fuselage, and was about 10 feet from the main wing. The aircraft struck the ground in a fairly steep climb, which resulted in the separation of the cockpit and its components in such degree that no information was obtainable on the position of cockpit controls and radio equipment. Several sets of items were found with webbing broken, and had broken other's straps, and in other cases attach straps were torn of the fuselage structure. The radio was not reported at impact. The landing gear sustained major damage but it was determined that it was actuated when the aircraft struck the ground in view of the flaps. Inspection of the propeller showed that the pitch of the propeller blades at ground impact was 41 degrees.

No evidence was discovered in examination of the Martin wreckage to indicate any such

disturbance or failure prior to the collision. Portions of the DC-3 left wing outer panel were recovered at the Martin wreckage.

The DC-3 struck in an open, flat field about 100 feet from the center of the Martin, approximately 20 miles northwest of the accident scene. The wreckage was about 1,000 feet, but generally concentrated at the group located by impact.

A number of fractured and torn sections of the left wing, outboard of the flap and portions of the outboard but were recovered between the two main wreckage sites. Further examination of the wreckage, coupled with the evidence, established that several feet of the left wing panel and portions of the vertical fin were torn off at the time of collision. The aircraft struck the ground in a steep climb, the left wing of the left wing, the nose section, and engine. The engine was disintegrated. No portions of the Martin structure were found at the main DC-3 wreckage site.

Four propeller nuts were found across the top of the fuselage, two in the vertical fin, and one in the left wing. The fin was badly cracked and torn, and the rubber was detached at the longer. The landing gear was recovered. The first section was damaged and showed the position of the flap in impact could not be ascertained. Examination of the propeller down section revealed that the pitch on the left propeller at ground impact was 41 degrees, and the right 39 degrees.

All radio equipment was in severely damaged condition. It was impossible to determine any contacts while it was, equipped with it in use at which frequency it might have been used.

Short before between the two main wreckage areas various pieces of the DC-3 left wing structure, left aileron, and the base of the vertical fin were intermingled with a portion of the Martin right wing landing gear out wing down.

Study of the wreckage at both places disclosed that substantially prior to impact the aircraft approached each other at an angle of about 10 degrees from head on, with the longitudinal axis of the two aircraft crossing to the left of the Martin and to the right of the DC-3. The aircraft were headed either in one another to find the left side of the Martin was higher than the right wing of the DC-3, while the right outer wing of the Martin and the left outer wing of the DC-3 were in position to collide. In addition, the collision design indicated that the Martin was striking relative to the DC-3.

The first impact component to come in contact was the left wing of the DC-3 and the right propeller of the Martin. The left wing of the Martin and the left wing of the other aircraft then struck, resulting in disintegration of the DC-3 wing in the contact area, and causing such structural damage to the Martin right wing that it separated from the aircraft before ground impact.

While the two wings were passing through one another, the left propeller of the Martin started to cut across the top of the DC-3 fuselage and through the vertical fin and outboard wing. The Martin moved across and to the rear of the other aircraft. Near the end of the contact period, the outboard side of the Martin left aileron suffered severe crushing damage on the

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# AVIATION WEEK

THE MAGAZINE OF AVIATION BUSINESS

ROBERT W. MARTIN, JR. PUBLISHER

200 WEST 42ND ST., NEW YORK 36, N.Y.  
A HARRIS-PULL PUBLICATION

August 1, 1955

## MEMORANDUM TO THE AVIATION INDUSTRY

The tremendous growth of aviation has created a whole new field of needed information services. Today, because of the great expansion of our industry, a publishing task of major importance is the establishment of our industry's first comprehensive annual buyers' guide with a circulation large enough to penetrate the industry's major purchasing influences, domestically and internationally.

November, 1955 will mark the publication of the AVIATION WEEK Buyers' Guide—an annual edition that will answer the long-felt demand of our industry's buyers, in civilian, Air Force and governmental capacities.

Questionnaires are now being mailed to every manufacturer of record engaged in the production and supply of aeronautical products and materials. A year-round research group under editorial supervision has been established to seek out new products, new terminologies—to check and double check the accuracy of all information to be published—the availability and actual production of all items featured.

AVIATION WEEK's annual Buyers' Guide will establish a publishing service unique to our industry. It will be complete and comprehensive—with complete listing of all manufacturers of aeronautical and allied products—not just a token listing, correct and complete addresses; sufficient cross indexing to locate any product regardless of terminology . . . and most important, the Buyers' Guide format will provide, in one complete listing, a simple, easily used method of locating any product. In addition to these important details, the Buyers' Guide will have trade name and distributor listings. These are the factors of completeness—these are the essential features that will make AVIATION WEEK's Buyers' Guide a must for every aviation purchasing influence.

I am sure you will find this annual guide the No. 1 sales and merchandising opportunity for the year-round promotion and advertising of your products, materials and services.

Your AVIATION WEEK representative will gladly give you full details on advertising rates, mechanical specifications, closing dates or any other information that you may desire.

Very truly yours,

*Robert W. Martin, Jr.*

Robert W. Martin, Jr.  
Publisher

### \* SAFETY

strament conditions prevailed from 950 to about 4,130 feet.

Capt. Workman was located on weather conditions being deceptive and had turned edge from the fact that a radio would become marginal as he approached. Since the flight was conducted without flight plan, no weather conditions which became poorer, and without communicating with any station on route, it is considered that he failed to exercise reasonable judgment and conducted this operation contrary to good operating practices. Good judgment would have dictated in light of the weather situation, that the flight should have been planned and conducted so as to avoid flying at low altitudes in marginal VFR conditions.

The DC-3 was operating in the control zone without being cleared to do so by the traffic control. Since the engine was less than 1,000 feet, this clearance was required.

The DC-3 was equipped with several transmitters and receivers. It is therefore considered probable that total radio failure could have occurred.

Considerable study and analysis of the reference was directed to the question of the point in space where the collision took place. It must have occurred shortly over the site where position of both aircraft were found interconnected. As to identify the testimony of ground witnesses, aircraft performance data, results of the test flight and other studies were carefully examined and analyzed.

It is impossible to assume that the DC-3 was in level flight on a steady heading. Whether a few feet above or below the level could not be definitely verified. However, the DC-3 soon by the witness as were the aircraft was probably the Carleton DC-3. There was no other DC-3 known to be in the area and the aircraft was headed in the general direction of the airport only a few minutes before the accident.

Since the DC-3 was not on an IFR flight plan the pilot could be expected to have had to maintain visual contact with the ground. Analysis of some witness testimony, however, indicates that it was being operated on the ground. The one factor was of the belief that he lost sight of the TWA aircraft because of its entry into the current.

Further, it will be recalled that one was now stated that an appreciable period of time elapsed between leaving the collision and the time in which the collision was apparently out of the current. One of the several witnesses, a scheduling, stated that he saw in explosion in the air which may indicate that the collision occurred at the base of or in the current. Other witnesses are less than good reports but not in explanation in the air.

During the several moments it took for the initial collision to reach the witness, the motion of the two aircraft would tend to make them continue along the same general path they had considerably prior to the collision. As a result, the two aircraft may have changed slightly very little during the interval until the first witness saw the motion.

Capt. Workman was a pilot of water year experience and should have been well versed in the danger of flying in a control

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## AIR TRANSPORT



## Convair Dart Airliner Details Revealed

First details of Convair's Dart twin-engine transport show it to be basically a 60-passenger, stretched 340 airplane powered by four Rolls-Royce K16's.

Designed as one of the entries in the original American Airlines' turboprop competition, which eventually was won by the Lockheed Electra (AW June 13, p. 12), the Convair Dart has since been offered to other airlines and to the military.

"It's a fine airplane, it would have fitted into lots of world-wide operations and it really ought to be built," said airline spokesmen. "But we're not so excited," he added.

Military interest centers around possible applications of the design as a high-off-rate bombardier and cargo carrier, or for aerial mapping.

Heart of the design is the powerplant: the R/R Dart 7 in its serial form is expected to produce 2,000 shaft hp take-off, compared to the 1,340 shp rating of current Darts in the Viking V-twin.

Alternate engines in the Convair proposal included the Armstrong Siddeley Mustang 7, the four-cylinder Allison 600 (D1), and the Napier Eland 1. Turbine engine proposals were evaluated for the full-powered Allison 901-D50

and the advanced Eland 4 turboprop. But there was some feeling about engine proposals that the powerplant spectrum narrowed down to two kinds available engines with less power than available in standard engines of the proper power rating. This may have been one contributing factor to the final evaluation of the design in American's competition.

The Dart will have a crew of four: pilot, co-pilot and two stewardesses.

Seats for the 60 passengers are in double rows, two abreast, in a compartment about 51 ft. long. Aisle width is 18 inches, and seat pitch for the 60 pas-

DART LAYOUT SHOWS MAIN ENTRANCE, CARRY-ON LUGGAGE BAYS AND LAVATORIES AHEAD OF PASSENGER CABIN







single configuration is 40 in. Standard lighting, rail buttons and monitoring controls are mounted on the underside of the bulk rack above the passenger heads.

Two structure stations and a bulk rack are on the rear portion of the fuselage. Lavatories are located in the passenger compartment.

Pilot and co-pilot positions are conventional, with provision for a third seat on a jump seat.

Two cargo compartments are provided, for a total capacity of 160 cu ft. Access to each compartment is through double high doors on the lower right side of the airplane which swing out and down. Forward bulk, along all the way, carries 110 cu ft; the aft compartment holds 170 cu ft. A net-type gate is at the aft side of each compartment and at the doors. Floor will support a maximum static load of 65 lb/sq ft.

#### For Comfort

Passenger seats will recline to 38 deg. with the exception of the first row of off-lying seats, and the last row which are reclined to 14 deg. Four rubber splitters and high-backed fabric covering are standard. Each seat has an integrated moving tray pointed on the seat back and folded into the back when not in use. Operation of the seat does not change the position of the reclined tray.

Engine engine is positioned to a maximum differential of six psi. Sea level altitude is maintained to about 14,000 ft; at sea engine altitude of 13,800 ft, the Convair Dart's cruise altitude is 6,000.

Cruise heating and ventilation can be obtained with engines off; heating or refrigeration are available with engines idling.

The usual conditioning engine exhausts have been ducted away from the fuselage for the prop tips about the fuselage for three feet and direct window air forced to clean exhaust.

#### Performance

Maximum payload of the Convair Dart is figured at 15,000 lb. This includes seven to 50 passengers at 180 lb each, plus 30 lb of baggage and 50 lb of cargo per passenger; plus an allowance of 1,000 lb of dry weight while in service.

All cargo figures were based on the American Airlines' requirements: flight time is 50-nigh headwind with a fuel reserve for two hours flight at 1,800 ft altitude at an indicated airspeed of 183 knots the speed for maximum range.

Standard design of the airplane is based on a speed of 150 mph, at the best cruise altitude for the engines. It was to be high enough to show operation of maximum cruise speed at all

points and altitudes so that descent could be made at cruise speed. This is understood to be a leading factor in Veejet operations, where rate of descent below 15,000 ft is restricted by structural limitations.

Range is roughly now specified by AA as 4,500 ft for sea level altitude on 90% maximum dry, with full payload for a 100 mi flight against a 50-nigh headwind with adequate reserves (adequate reserves are the figure quoted in the second paragraph above). For landing, the requirement was a 4,100-ft sea level runway at full payload with adequate reserve. American specified an altitude 6,000 ft runway length for landing with full payload (plus 1,000 lb) on flight against the 50-nigh headwind, plus adequate reserve.

Under these conditions the Convair Dart design shows these calculated performance figures:

- 110 mph cruise speed at 13,800 ft at landing weight
- 170 mi operating range at best altitude with full payload
- 4,500-ft runway lengths (CAR) for 100 mi trip
- 5,100-ft runway lengths (CAR) for 600 mi trip
- 1,600-mi top potential range reserves 1,200 mi at cruise plus 100 mi flight at 5,000 ft.

With two 300-hp piston units, range at best altitude is increased to 1,850 miles.

Engine weight of the Dart is 35,000 lb. Basic operating weight is 46,400 lb. With the 14,000-lb payload and 15,000 lb of fuel, the aircraft's weight becomes 67,000 lb.

#### TWA Building World's First Lean-To Hangar

World's first lean-to hangar is being built by James Ward Architects at Philadelphia International Airport. TWA reports the \$1,225,000 facility to double maintenance operations at Philadelphia where it is completed in the summer of 1955.

The 124-by-275-ft steel and concrete structure will be able to house two Lockheed 1049B Super Constellation at one time. Its 50-ft-high ground floor will include larger and overhead facilities for maintenance and flight crews will be on the mezzanine and second floor. Lean-to is on the east and north walls provide storage rooms, clerical offices, a fleet service room and the entrance lobby.

Roof will be supported entirely by overhead bridge-type cables 10 ft apart. The floor was designed to support 200,000 lb of aircraft with 90,000 lb per sq ft on steel loads.

Provision has been made for future extension that would double width.

## Popular DC-6A Setting Standards For Air-Freighter Performance

By Gordon Conley

New York-Douglas Aircraft Co's DC-6A Liberator is placing a seal on air cargo development market to that of the DC-3 in airline passenger loads. The DC-6A is expected to come close to equalling its 26-year-old ancestor's long operating life despite the large turbo-prop engine now flying on an over-engineered.

Like the DC-3, the Liberator is teaching airlines what new transport should and should not have. It will be able to match the DC-3's versatility as more commercial aircraft become available. It is stepping down to low important roles on medium and short-haul cargo routes.

#### User Testimonial

Most air cargo experts, with first visit to study the DC-6A, once Slack Airlines began operating the first in 1951, back up the evaluation of the Liberator in comments to Aviation Week.

Two instances of the air freighter include:

•American Airlines' director of cargo services, J. M. Glod. "As far as we're concerned, the DC-6A is the best and ablest transport for long-haul cargo. It is the airplane that can be operated economically."

•Slack Airlines' executive vice president, Gordon H. Slack. "The DC-6A is one of the best freight transport planes ever designed. The Lockheed C-119's and other turboprop transports are untested, and only the airlines have performance figures. So the C-119 is hard to evaluate."

"We believe the commercial version of the C-119 or other turboprops will be available in three to five years. In the DC-6A and the Lockheed 1049B will be good for cargo operations many years longer."

•Aeromexico Airlines' president, John E. Munkford. "The DC-6A is the best plane on the market today. It's seemed to be an ideal cargo transport. If you can get the volume to support a DC-6A, you can make a lot of money with it."

He believes you'll see DC-6As around for a long time to come."

•United Air Lines' superintendent of cargo development, E. L. Deane. "From testing the DC-6A features we like are its speed and large cargo capacity, its ability to permit overnight delivery of East to West Coast shipments and first-day delivery of continental coast-to-coast cargo."

"The cabin is suitable for cold long-hauling with no heated suit, space, forward and aft doors on a greater degree of protection, better storage and more efficient unloading loading. The lighting is excellent for night operations. Passengers seem to report more part of cabin comfort."

#### Criticism Rebuttal

Many airplane men follow up testimony of confidence in the DC-6A with one common criticism: flow of the cargo transport is too high. It is more truck-belt freight than air loading and unloading would be simplified and handling costs reduced.

American's Glod says this problem is mentioned by cargo handling personnel.

"It is now being solved by repairs to a proposed AA cargo dock that will be built to the DC-6A's floor level on one side and truck-belt height on the other."

The new dock will be in operation at the airline's major freight terminal in 1955 or 1956.

"With trucks on one side of the dock and planes on the other, we can load and unload simultaneously," says American's cargo service director. "And the dock's heavy floor will lead themselves to using mechanical equipment inside the transport-dock lifting cargo down from the back to where the cargo is to be loaded."

"By going into the plane with a power unit, we'll be able to lift pieces of cargo into that upper space of the DC-6A that has been unused so far. We'll be able to take advantage of every cubic foot of space in the cabin."

Without such a dock, Glod believes a few cubic feet would bring about little or no change in present cargo handling operations. "Improvement of truck-to-air loading has a lot of light of a significant point," he says. "A plane with a 50,000-lb payload and a truck-

#### DC-6A ORDERS

	Total Planned	Ordered	On Order
American Airlines	4	4	2
Canadian Pacific	2	2	0
Flight Time	2	2	0
Post American	2	2	0
Slack	2	2	0
United Airlines	2	2	0
United Caribbean	2	2	0

\* Four production line orders to Japan Air Lines and changed to DC-6As.

## Artillery Spotting



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## Communications



## Supply Drops



had bright faces, such as the C-130A, would need about 10 trucks to fill it up. Keeping the number of trucks lined up and waiting its turn at the door represents a considerable investment in time."

### Improved Freighters

American's cargo effort project is indicative of other efforts to better their present operation of the DC-6A. Other improvements include:

- **Increased payload** When the first DC-6A came off the production line, its maximum capacity was set at 29,500 lb. Peak now is 32,500 lb.
- **Dual landing systems** Dual's version of the DC-6A will have separate landing for the pilot's compartment and the cabin, providing controlled taxi positions for various types of cargo.
- **Fast loading** DC-6A loading time was once roughly 1 to 10 min as an emergency flight and 40 min to 1 hr 5 min at intermediate cities. Airlines

and USAF's Military Air Transport Service are trying to reduce this ground time through experiments with fast loading-consolidation of mail pieces into a large package.

"When we educate dispatchers on the idea of packing their airfreight in consolidated units, we'll be able to speed up the entire handling cycle and reduce cargo damage," says Glad. "We believe that loading is one of the reasons for cutting ground time."

"It has got to be reduced before we pass from the DC-6A to the larger transport freighters. We can't have a 54 million transport sitting on the ground for an hour while we load it."

### Future Outlook

All major airfreight carriers are watching closely the development of Lockheed's C-130A and the Douglas C-117. Industry observers report Panagra officials are weighing the

possibility of letting Lockheed accept commercial orders for its new turbo-prop freighters.

Shuf's Gordon Bins says of this possibility: "When and if the C-117 is available, Shuf certainly is interested in acquiring it if the transport performs as reported. For example, it's supposed to cost 4 cents per ton mile at least, as against costs, compared with 64 cents for the DC-6A. If this is true, it will be a better long-haul transport than any current cargo aircraft—cost 100 mph or better and with a 10,000-lb capacity."

American's Glad says that the C-130A and C-117 will allow airlines to make short adjustments in tariffs and attract shippers that can't get into the air now because of present high rates.

"But the DC-6A will be with us for the foreseeable future," he predicts. "The new aircraft will get what the DC-6A, one to medium-sized short haul routes."

# CAB Settles States-Alaska Fare Rules

By Craig Lewis

Washington, D. C.—Fair differences in the DC-4 and DC-6B flights between the continental U. S. and Alaska have been prohibited by the Civil Aeronautics Board in an settlement of the long time dispute over States-Alaska fares.

To back up its decision, CAB has set a schedule of airfares for services between the U. S. and various Alaskan points on routes of Pan American World Airways, Alaska Airlines, Northwest Airlines and Pacific Northern Airlines.

Major findings of the CAB in the States-Alaska Fare Case are:

- **Fare reductions proposed by the carriers** are unreasonable and extensive fares are required in order to stabilize the States-Alaska fare structure.
- **Fare differentials based on equipment** should not be established, and the operation of DC-6B aircraft at the same time charged for DC-4 service is not an unfair competitive practice.
- **Round-trip fare extensions** are set at 150% of maximum one-way fares.
- **Pacific Northern** should enter into a joint fare agreement with Pan American for through service to Pacific Northern's route beyond Japan.
- The Board also found that reduced month-long fares for passenger service in freight equipment are unreasonable and should be allowed to expire. Dual time is deferred in Northern's complaint against use by Pacific Northern of Constellation equipment in tourist service.
- The maximum fares set by the Board

for States-Alaska services are: Seattle-Ketchikan (tourist)—\$45; Seattle-Juneau (tourist)—\$55; Seattle-Fairbanks (tourist)—\$65; Seattle-Anchorage (tourist)—\$75; Seattle-Anchorage (first class)—\$165.

### Fare Cut Case

The States-Alaska Fare Case grew out of a series of fare cuts made in the four Alaska carriers' fares, which were touched by regulations made by Pan American in January, 1954. Those actions provoked a CAB investigation of the general passenger fare level, including comparison of PAA and NWA's rates with competing airlines with Pacific Northern and Alaska Airlines by using DC-6B aircraft at the same time applied to DC-4s.

The law issue in the case was whether fare differentials should be allowed to adjust for differences between Pacific Northern and Alaska Airlines' DC-4 aircraft and Pan Am's and Northwest's DC-6Bs.

Since the case started, Pacific Northern has acquired Constellation equipment, leaving only Alaska Airlines interested in the differential.

Except for Northwest's first-class Seattle-Anchorage service, States-Alaska passenger services are of a combination type with cargo carried in the main cabin with the passengers while the CAB classifies tourist service.

### Deep Differential

In deciding the fare differential, the CAB said "factors weighed include the relative value of service of the two types of aircraft, and finding that the

DC-6B combination service, as provided by Northwest and Pan American, is of the nature of a tourist service which makes efficient use of the maximum capacity of the plane by an aircraft which has no more equipment to operate than the DC-4, and in the light of our duties to consider as in the public interest the transportation and development of air transportation adapted to the needs of the economy, the Federal Service and the national defense, we find a difference in fares is not warranted."

"We believe that a fare differential would lessen the incentive of the carriers to find new and better equipment and thereby discourage the development of a sound air transportation system, in this case on our primary line of communication to the Territory of Alaska."

In its opinion, the Board said that it doesn't believe "better aircraft and better equipment which costs are more to operate is placed in tourist service, we are required to permit higher fares for the tourist services offered by the carrier equipment."

### Subsidy Consideration

In setting the fare levels, CAB considered the fact that States-Alaska operations are subsidized—the carriers received \$4,049,823 in subsidy in 1953.

Since steeply passenger service has been terminated, the air carriers now need the passenger traffic to maintain the U. S. and Alaska, the bulk of which is workers and businessmen not necessarily responsive to fare reductions.

Thus the Board finds no basis for a general fare reduction, nor does it find



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that may increase in time is indicated. CAB Vice Chairman Joseph P. Adams, designed with the support on the issue of the defense. He feels that there is a need for relief from the situation equipment in long-term competitive analysis. Adams points to the recent Colonel Adams had in reducing DC-4 lines between the U.S. and Bermuda as an indication of possible benefits for Alaska Airlines should it be allowed to offer lower fares on its DC-4 service.

### Admits Discount

Adams says that the majority action "indicated the type of reliable, unimpaired Board policy which should not exist if we are properly to regulate and develop a domestic and sound transportation system."

The majority decision here completely overlooks the fact that in past years, inter, more modern, aircraft are engaged by our carriers than has been and will continue to be an increasingly large number of serviceable and carefully safe, but nevertheless outmoded aircraft available for transportation in the public interest.

"A recognition of this fact should prompt this Board, it seems to me, to establish a means in which these obsolete aircraft can be utilized by our carriers under certain guidelines and practical conditions," Adams said in his statement.

## Navy Leasing R6Ds

### To Slick, Flying Tigers

Navy will lease two Sikorsky cargo planes to Slick Airways and Flying Tiger Line under terms of a program that is being set up by the Air Counciling Committee (Swire West Coast 12 p. 13).

Slick and Flying Tiger will each get two R6D Sikorsky, military version of the DC-6A, on a one year lease with a renewal provision. Rental on the aircraft is \$12,000 a month or \$127,000 a year.

Under terms of the lease, the carrier can move it at the end of the year by paying an option fee of \$25,000 or a plane of equivalent size and capability.

The lease will run until the aircraft is order is delivered.

Lease terms allow the Navy to recall the planes at any time by notifying the airlines that they are needed.

Navy says the feasibility of the program was proved earlier this year when a Sikorsky was leased to Slick for a experimental period. The experiment showed, says the Navy, that Navy cargo aircraft can be maintained and put to productive use without cost to the government.

contract, and still be available in an emergency.

Through requests of requirements and aircraft availability, Navy says it has won its potential mission with slightly fewer planes than it now runs through successful utilization. The Navy now has 55 Sikorsky, no new aircraft of the type are in order.

Navy is also leasing two R6D (C-54) aircraft under its old Defense Department program. The cargo planes will be leased to Riddle Airlines and Transocean Air Lines for the sum of \$15,000 a month.

The Riddle and Transocean lines don't have the purchase order provisions contained in the Slick and Flying Tiger contracts.

### PAA Increase

Pan American World Airways has increased its capacity 17% in its flights between New York and the Caribbean area.

PAA's Latin American Division flew 446,207,000 passenger miles in the first half of 1955, compared with 384,000,000 passenger miles for the same period of 1954.

## CAB ORDERS

July 14 to July 20

### GRANTED

Schedule and Western Airlines an attempt to spread its existing charter flight between New York and Frankfurt, Germany, pursuant to a contract with the K. F. Travel Club.

Part of New York Authority have to address in the Interstate-New York direct routing service agreement. With Alaska Airlines in connection to carry, and between New and Fairbanks, Alaska, and between New and Anchorage, Alaska, and between New and Seattle, Washington. Would Airlines request service at New as fuel decision in the investigation of other than the service, which would occur.

S. A. Empresa de Vuelos Aereos Confianza (Carg) a foreign air carrier get with authority of operation of various permits and links between Brazil and approximately New York and Washington, D. C. via Trinidad, RMI and Ciudad Trujillo, Dominican Republic.

### APPROVED

An agreement between various carriers adopted by International Air Transport Association concerning North Atlantic service commodity rates and schedule 11, 1955.

Lake Central Airlines' request for change with regard to its existing trust agreement, now membership of the board of directors and requirements for filing minutes of board meetings and of holding of voting trust certificates. CAB action pending and the voting trust agreement.

Agreement between Colonial Airlines,

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United Air Lines and makes other arrangements to use correct arrangements.

Three World Airways' agreement with the government of Saudi Arabia pending for technical assistance for Saudi Arabian airlines. CAA agreed to submit the information contained in the agreement from public disclosure.

#### ORDERED

White A-1000 transport and its use in all the air, prepared by the Board in 1954, came into the general stage in 1955.

Canadian New Services' authority to conduct an advance reconnaissance survey of Lake Island, Alaska, is extended to July 28, 1955.

Deutsche Luftfahrt Gesellschaft's foreign air carrier permit extended to allow this information to use the name Luftwaffe and Luftwaffe in the capital of the name. The carrier is authorized to use the name Luftwaffe German Air Line.

British Airways' exemption to provide its transportation to two Post & Telegraph point plant engineers extended to 60 days.

Make Post Plant Service's application for authority to operate as a consolidated and charter bus, consolidated with the other public service. The application is extended to 60 days for the purpose of the application.

Amendment of the Air Transport Service Code to include provisions for Military, Airline, Life, Control, Airline, and Military Airline for Submarine Service and a Life Control provision for the Air Transport Service.

#### DISBURSED

Three World Airways' application to include flights from, as an intermediate point between Port-au-Prince, Haiti, and Paris, at the request of the applicant.

Three World Airways' application for exemption authority to perform two flights between New York and Paris, at the request of the applicant.

Three World Airways' application to include flights from, as an intermediate point between Port-au-Prince, Haiti, and Paris, at the request of the applicant.

Application of Hines & Hines for a certificate between New York and South Africa, Mass. when the applicant failed to respond to a CAB request.

Application of Sun, Hines & Hines for a certificate between South Africa and New York, Mass. when the applicant failed to respond to a CAB request.

Proposal of the Air Line Airways & Airways' application for an order to show cause why the interests of American Airlines should not be suspended in the interest of the public interest.

#### ORDERED

Southern Air Transport's application for exemption authority to operate cargo flights in aircrafts in the air between New York, Mass. and Birmingham, Alabama.

Order Air Line's petition for reconsideration of a decision in the Quik Certificate Amendment Case added to Enclaves, 15, in an intermediate part on September 7.

The American World Airways' petition for reconsideration in the London-Panama-Rome service case.

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(Continued from page 47-50)

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(Continued from page 47-50)

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## Airborne Radar Boosts Transport Safety

Installation of airborne radar in transports of the major airlines and executive aircraft opens another major milestone toward improved air transport safety.

Pan American-Grace Airways is the first to use an airborne radar in its transport operations on a regular operation. Passages put its first DC-7 equipped with Bendix X-band radar into service last week on its South American route. American World's Washington Editor C. J. McAllister flew on this inaugural operation and will report on details on the use of radar in next week's issue. Last week, American World's Equipment Editor George Christen reported on the initial experience of executive plane pilots who are beginning to use airborne radar in their operations (page 56).

Three major aviation firms, Radio Corporation of America, Bendix Aviation Corp. and Collins Radio, are now manufacturing a variety of airborne radar specially designed for commercial transport operations. Thanks to the efforts of Aeronautical Radio Inc.'s Air Line Electronic Equipment Committee working with these aviation manufacturers, a standardized system of wiring, radar plumbing and antenna designs has been developed so that airplane manufacturers can build their transports to take either X-band or C-band radar.

In addition to the Passages DC-7 fleet installation

American Airlines, United Air Lines, Pan American World Airways, Continental Air Lines and National Airlines have already purchased airborne radar for fleet installations. Eastern Air Lines, Texas World Airlines and Braniff are expected to place their orders soon.

Airborne radar will not help much in alleviating the growing collision problem in the air, but it is a major aid in avoiding the turbulent region of clouds and so long range as all aircraft are airborne. More than half of the airline accidents in which passengers were killed in recent years were involved in turbulence problems. The safety contribution of airborne radar in this field is obvious. It also will permit the airlines to offer their passengers a smoother ride by being able to detect and fly through the radar turbulence of the "soft spots" that are always present, even in large storm areas.

In evaluating the contribution of industry to the recent development of this new safety device we can not overlook the pioneering of American Airlines in evaluating the original Navy AN/AP-42 military airborne radar for transport use and the work of United Airlines in evaluating C-band radar for service use.

The wide spread use of airborne radar marks a progressive step for air transport which will be heartily approved by its customers—the traveling public.

technical reports on new American, British and Russian aircraft and missiles. Among his many other outstanding stories was his series on the technical analysis of the British Concorde accidents, his "scope" on the first technical details of the Douglas DC-7C and the Boeing 707, and his series on the Nike guided missile system.

## Editorial Covers

On January 1, 1956 American World will begin the use of multi-color editorial cover covers replacing the advertisements that are now carried in that position. These editorial covers will feature new aircraft and missile designs, research developments and distinguished aviation personalities.

The shift to editorial covers is in line with the editorial publishing policy outlined in the January 24 issue on this page by American World Publisher Robert W. Martin Jr. It was quite possible to be the matchless opposition of the four pioneer American World front cover advertisements—General Division of General Dynamics Corp., General Aircraft Engineering Corp., Goodrich Aviation Products Division, and the Minneapolis-Honeywell Aeronautical Division.

The new editorial covers will bring major benefits to our subscribers and advertisers in helping to build a more useful magazine for the expanding aerospace industry.

—Robert W. Martin

2. In older radar, low-flying planes were not so good at being spotted as they are now.

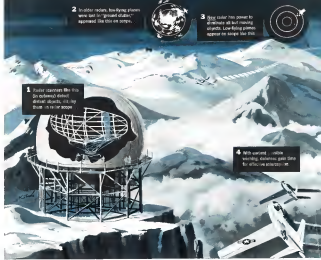


3. New radar has the power to determine altitude and heading of objects. Low-flying planes appear to be spotted by this.



1. Radar stations like this can detect distant objects, tell just how far they are away.

4. With current radar, working distance goes down for effective detection.



## More Technical Coverage

David A. Anderson has been appointed assistant managing editor (technical) to direct the expanding technical coverage to be offered American World readers. This expansion of technical coverage will include not only more intensive reporting on the fields already featured such as aeronautical engineering, production, aviation and new equipment, but also will continue development into new fields such as guided missile engineering (a feature that began in the July 1954 issue), nuclear energy and propulsion development, astronautics and the new achievements reported by hypersonic. Dave Anderson is particularly well qualified for his new post. He is an aeronautical engineering graduate of Northwestern Polytechnic Institute and had 10 years experience in the aircraft industry as draftsman and powerplant design and guided missiles before joining American World in 1950 as engineering editor. During his five years on the magazine he has become particularly well known for his



## NEW POWER SOURCE TIGHTENS RADAR DEFENSES

Milovan Walt Klystrons Aid Detection of Distant, Low-Flying Planes

### THE STORY BEHIND THE STORY

What is the significance of the headline above? It has to do with one of our headline expressions. You can't do it if you can't see it—approaching planes that formerly evaded radar detection can now be seen at greater distances than ever before.

Behind this improved radar vision is a new family of high power tubes known as Magnetron Klystrons. These new tubes not only provide greater ability for homing radar operators against well and distant objects, but provide a new

approach to a technique known as M.T.I. or Moving Target Indication. In radar vision M.T.I. overcomes what the beam of the radar operator on the viewing scope. Images from trees, houses, buildings all combine to form "ground clutter" on the scope. M.T.I. eliminates this "ground clutter" by reducing moving objects only. Therefore with Magnetron Klystrons, approaching aircraft can be spotted sooner and defenses can be alerted more quickly.

Producing millions of watts of direct current power, these giant tubes make possible illumination of small objects

with radar impulses at greater distances to provide clear, sharp images on the radar scope. Furthermore, the Magnetron Klystrons' stable performance and long life assure that these radar services are constantly on guard.

■ The Klystron tube made maximum tube possible. Developed by Sperry, it generates, amplifies or detects microwave energy. Today, Sperry produces Klystrons covering a wide range of powers and frequencies for specific requirements—both military and industrial. To most aircraft, but those tubes, a new giant has been opened devoted exclusively to Klystron research and production.

**SPERRY** AN ELECTRONIC COMPANY  
Spartan, N.Y. 14159

Circle 10 on Reader Service Card





## ANNOUNCING...

### the Beryllium Copper ROLLPIN®

*Strong . . . highly resistant to corrosion . . . nonmagnetic . . . extremely conductive*

Now you can use Rollpin to cut assembly and maintenance costs in a whole new group of applications. A new line made of beryllium copper, one of the strongest of the copper base alloys, opens the door to a wide variety of uses where resistance to corrosive attack, good electrical properties and other unusual characteristics are required. These slotted tubular copper spring-pins can be used in assemblies that range from plumbing fixtures to electrical instruments, particularly in conjunction with other copper base alloy components.

Rollpin has already established its ability to replace taper pins, straight pins and set screws; to serve as a rivet, dowel, hinge pin, cotter pin or stop pin . . . eliminating special machining, tapping and the need for hole reaming or precision tolerances. Driven into a hole drilled to normal production standards, it locks securely in place, yet can be readily drifted out and reused whenever necessary.

Rollpin is available in beryllium copper from .062" diameter to .250" diameter, and in steel and stainless steel up to .500" diameter.

**ELASTIC STOP NUT**



**CORPORATION OF AMERICA**



or a rivet

**ROLLPIN**  
TRADEMARK



a clevis pin



replace tapered pins



a set screw

Dept. R35-825, Elastic Stop Nut Corporation of America  
2330 Vauxhall Road, Union, New Jersey

Please send me the following free fastening information:

- ☐ Data on beryllium copper Rollpin      ☐ Here is a drawing of our product. What self-lacking fastener would you suggest?

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